

THE DEVELOPMENT OF AN INSTRUMENT FOR THE
MEASUREMENT OF CURIOSITY IN
PRESCHOOL CHILDREN

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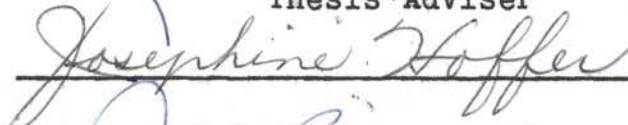
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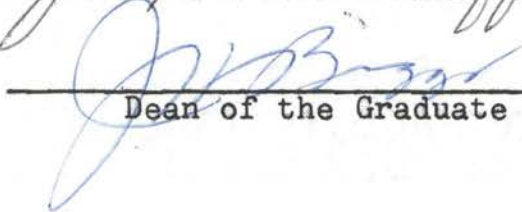
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TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Purpose	1
Definition of Curiosity	1
Problem	2
Procedure	2
II. REVIEW OF LITERATURE	4
Studies Related to the Exploratory Behavior or Curiosity in Animals . . .	4
Stimulus Novelty	5
Stimulus Complexity	5
Studies Related to Curiosity in Humans. .	6
Stimulus Novelty.	6
Stimulus Complexity	7
Affective Value of Stimuli.	8
Curiosity and Adjustment.	8
Curiosity and Learning	9
Implications for the Present Study. . . .	10
III. DEVELOPMENT OF THE INSTRUMENT.	12
Subjects.	12
Pilot Work.	13
Observations of Curious Behavior in Free Play	13
Observations of Curious Behavior in Controlled Situations	14
The Research Instrument	17
Criteria.	17
Selection of Designs.	18
Description of the Instrument	18
Administration.	20
Scoring	21
Recommended Analysis.	22
IV. RESULTS.	23
Validity of the Instrument.	23
Reliability of the Instrument	25
Sex and Age Differences	26

Chapter	Page
Problems Involved in the Task	27
Projected Pilot Study	28
Subjects	28
Description of Refined Instrument.	28
Administration	29
Scoring.	30
Results.	30
Summary	34
V. SUMMARY AND CONCLUSIONS.	36
Recommendations for Future Research . .	38
SELECTED BIBLIOGRAPHY	39
APPENDIX A.	42
APPENDIX B.	54

LIST OF TABLES

Table	Page
I. Frequency of Large and Small D-Scores Obtained by Control and Experimental Groups of Preschool Children in a Task Designed to Measure Preference for the Novel (Experiment I)	24
II. Frequency of Negative D-Scores, by Sex and Age, Obtained by Preschool Children in a Task Designed to Measure Preference for the Novel (Experiment I)	26
III. Frequency of Large and Small D-Scores Obtained by Control and Experimental Groups of Preschool Children in a Task Designed to Measure Preference for the Novel (Experiment II).	33
IV. Total Number of Novel Designs Chosen in Relation to Children's Verbal Contribution in a Task Designed to Measure Preference for the Novel (Experiment II).	34
V. Age, Sex and Raw Scores of Individual Children Participating in the Experimental Group in the Development of an Instrument Designed to Measure Preference for the Novel (Experiment I)	43
VI. Age, Sex and Raw Scores of Individual Children Participating in the Control Group in the Development of an Instrument Designed to Measure Preference for the Novel (Experiment I and II).	49
VII. Age, Sex and Raw Scores of Individual Children Participating in the Experimental Group in the Development of an Instrument Designed to Measure Preference for the Novel (Experiment II).	52

LIST OF FIGURES

Figure	Page
1. Paired Familiar and Novel Designs Used in a Study of Curiosity in Preschool Children	19
2. First Page of Score Sheet for the Refined Instrument Designed to Measure Curiosity in Preschool Children.	31
3. Second Page of Score Sheet for the Refined Instrument Designed to Measure Curiosity in Preschool Children.	32

CHAPTER I

Purpose

The purpose of this research is to investigate ways in which the curiosity of preschool children may be measured. This research will be an exploratory study which may serve as a basis for the development of a reliable and valid research instrument.

Definition of Curiosity

Gardner Murphy (1958, p. 171) described curiosity as "that capacity to react vibrantly to new content, new relationships, new processes, new persons, and new aspects of oneself." Curiosity is similarly defined by McReynolds (1961) as the tendency to seek novel percepts.

For the purpose of this study, curiosity will be limited to exploration of novel external factors only. Curiosity will be defined as susceptibility to instigation by an environmental novelty. This characteristic is demonstrated by behavior initiated by the individual for the apparent purpose of gaining information about the external world, or briefly stated, exploratory behavior.

Problem

Curiosity has long been recognized as a motivating characteristic in human behavior. It is quite evident that young children are extremely responsive to new events and objects in their environment. Piaget's (1952) observations of his own children attest to the prevalence of exploratory and manipulatory activities that result from novel and unfamiliar situations.

As children grow older their intense desire to explore apparently diminishes. Getzel and Jackson (1962) state that the curiosity of children seems to undergo alteration with age. They imply that children learn to suppress, or redirect their inclinations to seek the unknown or explore the mysterious.

This diminishing desire to explore or seek the unknown for the purpose of gaining more knowledge about the external environment has presented a problem to educators who are interested in encouraging curiosity. Specifically, the problem becomes that of identifying curiosity in early childhood and gaining an understanding of the factors which are instrumental in its development.

Procedure

The reader should recall that the purpose of this exploratory study is to investigate ways in which the curiosity of preschool children may be measured.

For the accomplishment of this purpose the following steps were involved:

1. The literature was surveyed for a better understanding of curiosity and the research that had been done in this area.

2. Preschool children were observed in an attempt to identify curious behavior and to clarify the experimenter's definition of curiosity.

3. Pilot work was done in order to determine the necessary criteria for the instrument.

4. The instrument was developed and administered to children of preschool age.

5. The data were analyzed and interpreted.

6. The instrument was refined.

7. A projected pilot study was made with the refined instrument.

8. The data from the pilot study were analyzed and interpreted.

9. Recommendations were made for future use of the instrument.

CHAPTER II

REVIEW OF LITERATURE

Introduction

There has been much interest in the manner in which an organism increases his contact with new or unfamiliar environmental situations. Some investigators have been concerned with testing theoretical constructs, some with the variables that elicit exploratory behavior, and some with the relationship of this behavior to both learning situations and adjustment.

Research in the area of curiosity or exploratory behavior has been conducted with both animals and humans. Studies relating to both will be reviewed in the literature.

Studies Related to the Exploratory Behavior or Curiosity in Animals

A number of experiments have appeared which study the exploratory behavior of animals. The investigations in this area which may have significance for the present research are those concerned with stimulus novelty and complexity.

Stimulus Novelty

Novelty has been one of the first properties investigated as an environmental factor that evokes exploratory behavior in animals. Berlyne's (1950) experiment showed that rats spent more time exploring a novel stimulus than familiar stimuli. The introduction of novel stimulus objects to young chimpanzees was found by Welker (1956) to increase exploratory responses. Dember's (1956) investigation indicated that rats in a T-maze entered the arm that had been changed from a previous trial more often than they entered the unchanged arm. Montgomery (1951) found that rats preferred the maze units that they had least recently occupied.

Stimulus Complexity

Complexity of the environment factors that evoke exploratory behavior in animals has also been investigated. Studies by Berlyne (1955) and Berlyne and Slater (1957) indicated that rats explored an environment which presented numerous and complex stimuli more than they explored one presenting few and simple stimuli.

Carr and Brown (1959) found in their study of the manipulation of stimuli by rhesus monkeys that the more physical change the monkeys could produce in the stimulus object the greater amount of time they spent with that object.

Welker (1956), in his study of incentives that elicit exploratory behavior in chimpanzees, found that a stimulus object which, when manipulated, caused a change in the situation, elicited more exploration than one which did not cause change. He also found that the stimulus preferences were predominantly the ones which were the more movable, larger, brighter, more heterogeneous, and had changing stimulus configurations.

Studies Related to Curiosity in Humans

More and more interest is being shown in experiments related to aspects of curiosity in humans. The research that may have significance for the development of an instrument to measure curiosity in preschool children is that concerned with stimulus novelty and complexity and the affective value of stimuli.

Stimulus Novelty

In a series of experiments with adult subjects Berlyne (1951; 1957a; 1957b; 1958) found that the stimuli that had been changed were more likely to arouse a response than were the ones which remained unchanged. The subjects also spent more time watching novel stimuli on a screen when novel and familiar stimuli were presented at the same time.

Mendel (1962), in an experiment in which preschool children were given a choice of playing with one of five

arrays of toys, some of which had been used in an earlier habituation play period, found that the novel objects were preferred over the non-novel objects. Smock and Holt's (1962) study of environmental events which produced curiosity in six year old children, indicated that the novel objects elicited more perceptual contact than the non-novel objects.

In an investigation by Cantor and Cantor (1964a), it was found that kindergarten children who were given a chance to become familiar with a set of pictures spent less time observing these familiar pictures than they did a novel set.

The results of a follow-up investigation (Cantor and Cantor, 1964b) confirmed these findings and showed that the difference in time spent observing familiar and novel pictures was greater when the degree of familiarity was greater.

Stimulus Complexity

Berlyne (1958) sought to find whether adults would respond differently to the more complex of two stimulus configurations. The subjects were presented with a succession of pairs of visual figures and in all cases more time was spent looking at the more complex figure.

Smock and Holt (1962) found that more complex objects elicited more perceptual contact than less complex objects. Cantor, Cantor and Ditrich's (1963) study indicated that

preschool children spent more time observing the high as opposed to the medium and low complexity stimuli.

Affective Value of Stimuli

The above findings suggest that there is a tendency for adults and children to prefer novel stimuli; however, in a discussion of affective value of stimuli Berlyne (1960) indicated that the preference for certain stimuli may be related to an association with rewarding or punishing situations. A binocular-rivalry experiment was conducted in which Zulus were exposed to a picture of a European and a picture of an Indian simultaneously. The Indian was perceived more frequently even though he was more familiar than the European. The affective value of this stimulus picture was attributed to the economic threat that the South African of Indian extraction represents for Zulus.

Similarly, American and Mexican subjects who simultaneously viewed scenes of life in the United States and Mexico tended to see whichever picture was representative of their own country.

Curiosity and Adjustment

McReynolds (1958) postulated that an exploratory behavior score would be negatively correlated with anxiety, but in his studies with psychiatric patients, he did not find a significant correlation. A later study (1961) in

relation to psychological adjustment of sixth grade children supported his hypothesis that object curiosity would be related negatively to maladjustment and positively to adequacy of adjustment.

Mendel (1961), in his study of degrees of novelty in preschool children, found that children who prefer lower degrees of novelty have a higher anxiety level.

Curiosity and Learning

Studies of curiosity and learning in animals have been conducted by several researchers. Montgomery and Segall (1955) indicated that rats could learn a black and white discrimination task in order to gain access into a large Dashiell type maze.

Harlow and his associates (1950) found that monkeys could learn to solve a three-part interlocking mechanical puzzle when the only reward was that of manipulating the objects. Harlow and McClearn (1954) proved that a color discrimination task could be learned from manipulative incentives. Butler (1953) found in his study of visual curiosity of monkeys that a blue-yellow discrimination problem could be learned when the only reward was a view of the outside environment. In all of these investigations, the younger monkeys had the strongest tendencies to explore all objects and situations. This marked tendency in younger animals suggests that curiosity may be largely responsible for early and extensive learning.

The primary interest of Maw and Maw (1961; 1962; 1963) has been in the relationship of curiosity to learning in elementary school children. They identified the children with different degrees of curiosity by self-ratings, and ratings done by teachers and peers. The results of their studies supported the hypothesis that children with a high degree of curiosity as compared to those with a low degree of curiosity do better on information recognition and sentence meaning tests and show a preference for discussing unbalanced and unusual designs rather than balanced and familiar designs.

Implications for the Present Study

The need for further study of curiosity and specific implications for the present research can be found in the literature. Many of these studies indicate the importance of gaining a better understanding of curiosity. Several studies imply that learning is motivated by exploratory behavior or curiosity. Other studies indicate that curiosity is related to adjustment. It follows that poor adjustment or high level of anxiety, which inhibits curiosity, would as a result interfere with creative learning.

Several pertinent points from the literature will prove valuable in the present research design.

1. Organisms respond more readily to novel stimuli.

2. Complex stimuli attract more attention and evoke more curiosity than simple stimuli.

3. Stimuli that cause changes when manipulated elicit more exploratory behavior than stimuli which do not cause change.

4. Affective value influences the selection of stimuli.

CHAPTER III

DEVELOPMENT OF THE INSTRUMENT

This chapter will include (1) a description of the subjects who participated in the research; (2) a discussion of the pilot work; (3) a description of the research instrument, its administration and scoring; and (4) recommendations for data analysis.

Subjects

The subjects who participated in this research were 168 preschool children. The majority of these children were in attendance at nursery school, kindergartens, and day care centers. The age range was from three years zero months through five years eleven months. The children in the experimental group, 120 in all, were equally distributed throughout this range with ten boys and ten girls in each six month period, (3:0-3:5; 3:6-3:11; 4:0-4:5; 4:6-4:11; 5:0-5:5; 5:6-5:11). For the comparison of control and experimental groups, 48 of the experimental children were matched on sex and age (within two months) with 48 control children.

No children who participated in the pilot work were included in the final study.

Pilot Work

Observations of Curious Behavior in Free Play

Children were observed in a free play situation for the purpose of clarifying the definition of curiosity. Several observers discussed examples of behavior which seemed to indicate curiosity. Common to each example was the fact that the behavior was initiated by the child for the apparent purpose of gaining information.

The possibility of studying curiosity by observing children in a free play situation was explored. Three different methods of judging curiosity were tried in an attempt to establish observer reliability.

1. The first was a study of five pairs of children. Two children were observed for three minutes each. Behavior indicative of curiosity was recorded and one of the children was judged to be the more curious of the two.

2. The frequency with which children exhibited curious behavior was then studied. Each of three children was observed **ten different** times. Each observation was continued until the child exhibited curiosity, and the time interval involved in each observation was recorded. The score for each child was the total time involved in the ten observations. The child with the lowest score was judged to be the most curious.

3. Another approach was a study of the total amount of curious behavior exhibited during a specific time interval. Each of five children was observed during six five minute intervals, for a total of thirty minutes. Each child's score was the total number of times that his behavior indicated curiosity. The child with the highest score was judged to be the most curious.

One major problem occurred in all of these attempts to establish observer reliability. The three observers who participated in this pilot work agreed on the child who was the most curious but they disagreed when specific incidents of curious behavior were discussed. For example, one observer ranked a child high in curiosity when he was lying on his stomach watching a "roly poly." Another judge did not consider this child curious because he had seen and handled a "roly poly" numerous times. This problem suggested that a more objective way of evaluating curiosity was needed.

Observations of Curious Behavior in Controlled Situations

Several attempts were made to provide children with objects which would invite exploration. To be acceptable for the research, an object should be one which suggested a variety of exploratory responses, and objective scoring of these responses should be possible.

1. Small round metal boxes with screw lids (used film cartons) were tried. Two of these boxes, one empty and one containing something, were offered to the child. The various methods of exploring and manipulating the boxes were noted. There were few different ways in which the children could play with the boxes; and therefore different degrees of curious behavior could not be determined. Only two children were used in this step of the pilot work.

2. The method of studying exploratory behavior developed by McReynolds (1961) was adapted for use with preschool children and was administered to 16 children. Several different toys (e.g., a screwball, a needle threader, pieces of tile, a collapsible cup, jumping beans, a cedar disc) were presented to the child, one at a time, and the numerous ways in which he explored them were recorded. Several problems were apparent. Scoring tended to be subjective inasmuch as it was difficult to determine whether the child was merely playing with the toys or whether he was exploring in order to learn something about them. Many of the children wanted to be given the toys in quick succession and therefore laid each toy aside without playing with it; a few children played with one toy for a rather long time; and some children wanted to combine the toys in play.

3. A wooden box, approximately 8" x 6" x 30", was constructed. The box contained four compartments, each with its own door. A different type of latch was used on

each door and each compartment contained something which should invite exploratory behavior. When the first door was opened, three small blocks were automatically released and spun. When the second door was opened, a bicycle horn blew. The third compartment contained a camera which could be taken apart. The fourth compartment contained two mirrors placed so that they reflected pennies which were on the floor of the compartment. Each child, 18 in all, was given complete freedom in his play with this box.

Problems presented by the wooden box were similar to those in the pilot work described above. The four different latches apparently evoked no curiosity. The judgment of curious behavior was difficult because some children spent a long time with one compartment while others went quickly from one compartment to the next. The complexity of this task and its scoring suggested the advisability of focusing attention on one small aspect of curiosity which might be measured objectively.

4. Throughout this pilot work the focus was on the development of a controlled situation in which a child would be invited to explore the unfamiliar or the novel. Essentially, this would be a situation in which a child would show a preference for the novel, which is one factor in curiosity. The need for a more controlled situation and a more objective method of scoring led to a modification of the tasks developed by Cantor and Cantor (1964a),

designed for use with kindergarten children in a study of preference for the novel. The modification consisted of a set of paired designs, one familiar to the child and the other novel. The child constructed a booklet by choosing one design of each pair and thus indicating his preference for either the familiar or the novel. Pilot work with five children suggested that this modified task was appropriate for preschool children, could discriminate those who preferred the novel and those who preferred the familiar, and could be scored objectively. The decision was made to use this instrument exclusively in the present research, therefore, the development of this instrument will be described in detail.

The Research Instrument

Criteria

On the basis of the pilot work and the relevant research reported in the literature, the following criteria were accepted for the research instrument.

1. The task should be simple and of interest to preschool children.
2. The task should be short enough so the children will not become tired or disinterested.
3. The task should offer a choice between familiar and novel.
4. The scoring should be objective.

Selection of Designs

The choice which the child was given between the familiar and the novel, was a choice between the two designs. The selection of appropriate designs was therefore the first step in the development of the instrument.

Approximately 80 designs were shown to 13 children for their reactions. Those to which the children openly objected were discarded. The remaining designs, 66 in all, were paired and the children were asked to indicate their preference for one design in each pair. This was done in order to determine whether the two designs in each pair were equally well liked. When the two designs in a pair were not equally liked, the designs were modified and again presented to the children. Ultimately 20 pairs of designs were retained for the instrument.

Description of the Instrument

The instrument consisted of 20 pairs of different designs, each design being drawn on a shiny colored page, approximately 3" x 2" in size. The paired designs are pictured in Figure 1. Many different background colors were used for the designs, but each pair of designs was presented on the same background color.

In each pair one design was arbitrarily designated as familiar and the other as novel. An additional set of the designated familiar designs were drawn on white pages for use in familiarizing the children with these designs

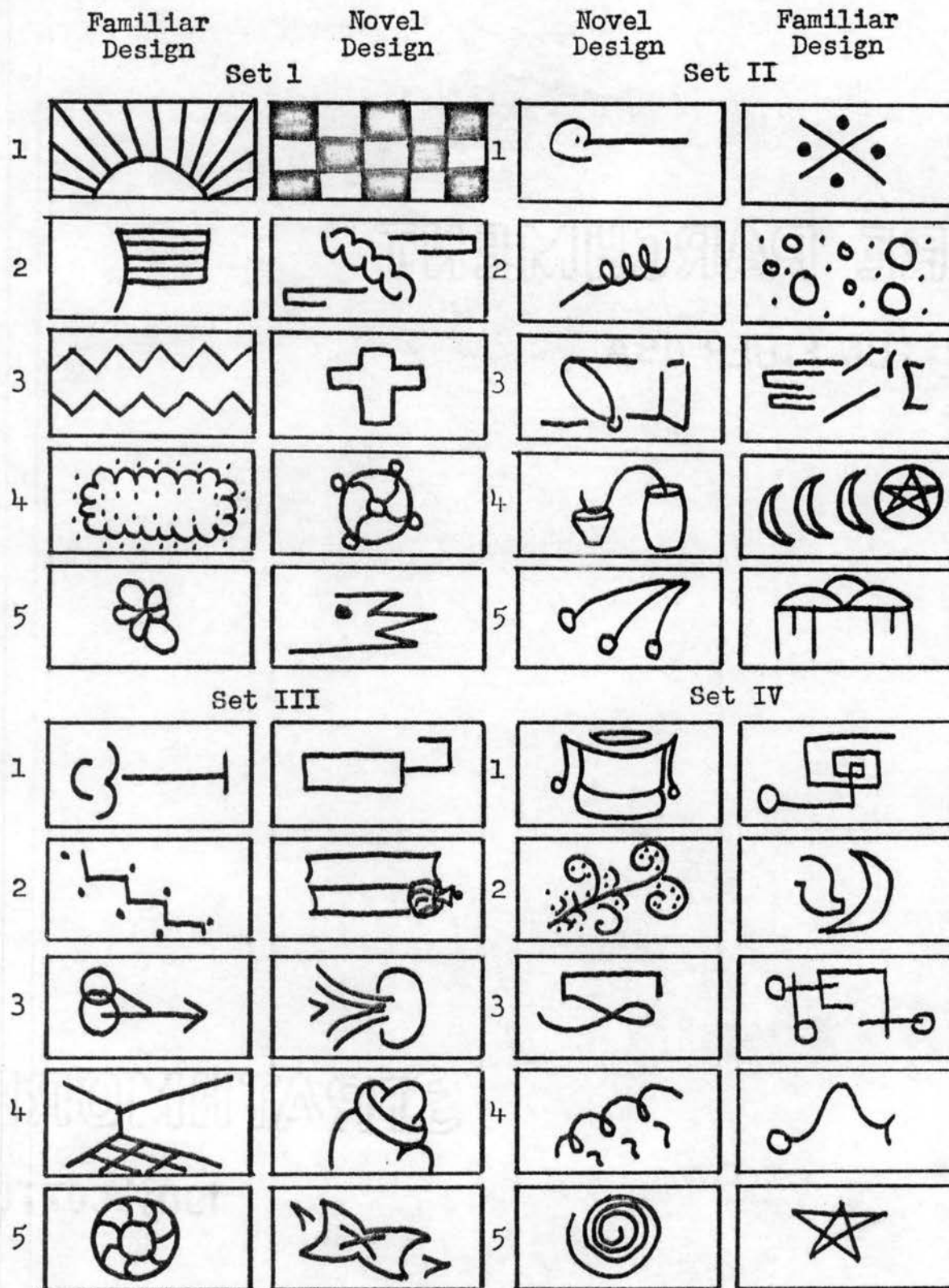


Figure 1. Paired familiar and novel designs used in a study of curiosity in preschool children.

before they were given an opportunity to choose between the familiar and the novel in the paired designs.

Administration

The paired designs were placed in four sets, five pairs in each set. The child was given an opportunity to become familiar with one design from each pair in the first set and was then given his choice of the two designs in each of these pairs. This process was repeated with each set of paired designs.

During the familiarization process the child was shown one design at a time and was encouraged to talk about it. If he hesitated the experimenter suggested what the design might be or asked a question such as "Could it be a star?" and encouraged further description of the design. After the five designs had been discussed in this manner and were on the table in front of the child, the experimenter removed them one at a time, again naming them as she did so.

The child was then shown a pair of designs, in which one was now familiar and the other novel. He was asked which he liked best or which he wanted to take home. The chosen picture was then given to the child, and this process was repeated with the remaining paired designs.

Each child was shown four sets of paired designs, five pairs in each set. The position of the familiar and novel designs, as they were placed before the child, was

alternated from one set to the next. In the first and third sets the familiar design was placed on the child's left and in the second and fourth sets the familiar design was placed on the child's right.

A control group of children, matched with the experimental group on sex and age, were given an opportunity to choose between the paired designs without becoming familiar with either design before making their choice. This was done in order to make certain that the choices of the children in the experimental group were not merely the result of chance but did indicate a preference for the novel or the familiar.

Two minor problems occurred in the administration of the task. A few children seemed to tire, and for these children the task was administered in two sittings. A few children indicated a strong dislike for one particular color and refused to choose either design. When this occurred, the experimenter offered to draw the design which the child preferred on another color of his own choosing.

Scoring

The scoring consisted of a simple count of the number of familiar designs and the number of novel designs chosen by the child. A D-score, or difference score, was figured by subtracting the number of novel designs chosen from the number of familiar. The possible range of

D-scores was from +20 (complete choice of the familiar) to -20 (complete choice of the novel).

Recommended Analysis

1. The validity of the instrument should be determined by comparing the D-scores of the experimental and control children.

2. The responses of the children in the control group should be studied to determine whether the designated familiar and novel design were equally attractive to the children.

3. The reliability of the instrument should be determined by means of a split-half correlation.

4. The data should be analyzed for age and sex differences.

CHAPTER IV

Results

The research instrument which was developed for the measurement of curiosity was focused on preference for the novel and offered the children a choice between familiar and novel designs. The instrument was administered to 120 children, ranging in age from three years zero months through five years eleven months. The validity and reliability of the instrument were tested, and sex and age differences were studied. The findings of the data analysis are presented in this chapter.

Recommendations for a refined instrument prompted a projected study. The refined instrument is described and the findings of this projected pilot study are also presented in this chapter.

Validity of the Instrument

The responses of the control and experimental groups were compared in order to determine whether the children in the experimental group were responding to the novel and the familiar. The D-scores, representing the difference between the number of novel and the number of familiar designs chosen, would be relatively large if the children

showed a preference for either the novel or the familiar, but would be small if the children's responses were the result of chance. The D-scores for the children in the control group would necessarily be small inasmuch as these children had no previous experience with either design and their choices between the designated familiar and novel designs would be the result of chance.

In Table I, the frequency of large and small D-scores are presented for the matched control and experimental groups.

TABLE I

FREQUENCY OF LARGE AND SMALL D-SCORES OBTAINED BY CONTROL AND EXPERIMENTAL GROUPS OF PRESCHOOL CHILDREN IN A TASK DESIGNED TO MEASURE PREFERENCE FOR THE NOVEL (EXPERIMENT I)
(N=96)

	D-Scores		
	0-4	5-20	Total
Control Group	41	7	48
Experimental Group	32	16	48

$X^2 = 4.631; p < .05.$

A Chi-square analysis of these data indicates that significantly more children in the experimental group had large D-scores ($X^2 = 4.631; p < .05$). These children were influenced by the opportunity to choose between the familiar and the novel; therefore, the instrument was

accepted as valid. (The D-scores for individual children are given in Tables V and VI, Appendix A).

The question of whether the attractiveness of the designs influenced the children's choices must be raised. If the paired designs were not equally attractive, the children's choices would be influenced and the validity of the instrument would be questionable. Care was taken in pairing the designs; nevertheless, the choices of the control children were analyzed in order to verify the fact that the paired designs were of similar value. In 17 of the 20 pairs, the two designs were chosen with approximately equal frequency indicating that they were equally attractive. In the remaining three pairs, the design designated as novel was chosen twice as frequently as the other designs, indicating that it tended to be more attractive. This difference in attractiveness of the designs is sufficiently small so that it could not bias the scores in the present study. However, it is a minor problem which can and should be corrected in the refinement of the instrument.

Reliability of the Instrument

The internal consistency of the instrument was determined by means of a split-half correlation using the Spearman-Brown formula. For this analysis the number of novel choices in Sets I and II were correlated with the number of novel choices in Sets III and IV. The responses of the 120 children in Experiment I yielded a correlation of $+0.692$ ($p < .01$), indicating that the instrument is reliable.

Sex and Age Differences

Sex and age differences were determined by an analysis of the frequency of negative D-scores which were obtained by 39 children in the first experiment. A negative D-score indicates that the majority of the choices were novel designs. The frequency of negative D-scores is presented in Table II.

TABLE II

FREQUENCY OF NEGATIVE D-SCORES, BY SEX AND AGE, OBTAINED BY
PRESCHOOL CHILDREN IN A TASK DESIGNED TO MEASURE
PREFERENCE FOR THE NOVEL
(EXPERIMENT I)
(N=39)

(Ages expressed in years and months)

Age	Boys	Girls	Total
3:0 - 3:11	3	4	7
4:0 - 4:11	7	6	13
5:0 - 5:11	11	8	19
Total	21	18	39

Chi-square analyses indicated that there were no significant sex differences in preference for the novel ($X^2 = 0.115$; n.s.), but that there was a tendency toward an age difference ($X^2 = 5.538$; $p < .10$). The older children tended to choose the novel design more frequently than did the younger children.

Problems Involved in the Task

During the present study, several problems arose which suggested the need for revisions in the task.

Several of the children talked about the novel design presented to them before they made their choice of the design they wanted to keep. By doing this, they became familiar with the novel design with the result that their choice was then made between two familiar designs.

Two children consistently chose the familiar design the experimenter had talked about but tended to choose the novel design when they had expressed their own ideas about the familiar design with which it was paired.

A few of the children indicated by their comments that they may have felt that they were supposed to take the familiar design. For example, one child said, "I took all the ones we talked about, didn't I?"

In view of the problems encountered, the following recommendations were made for refining the instrument:

1. The possibility of a child familiarizing himself with the novel design could be prevented if a colored page with no design were shown to the child and he understood that he would receive a "surprise" design if he chose that page.
2. The three pairs of designs which were not equally attractive to the control children should be modified.
3. The process of familiarizing the child with one design in each pair should be more controlled. Specific

comments should be planned for each design and time should be allowed for the child to present his own ideas. Adequate control of this process should make it possible to study the relationship between preference for the novel and a child's freedom to express his own ideas.

In line with these recommendations, except that the designs were not modified at this time, a projected pilot study was planned.

Projected Pilot Study

Subjects

The children included in the projected pilot study were 13 boys and 16 girls. The age range was from two years ten months through six years five months. A control group matched with this new experimental group on sex and age (within two months), was selected from the original control group of 54 children.

Description of the Refined Instrument

The same paired arrangement of designated familiar and novel designs were used in the refined instrument as in the original instrument. Each design was placed in a separate envelope and was identified by a corresponding colored page pasted to the front of the envelope. For the familiar, the design itself was shown on the outside of the envelope; but for the novel, a blank colored page was on the envelope and the child was told that the envelope contained a

"surprise" design. In this way the possibility of the child becoming familiar with the novel design before making his choice was prevented.

Administration

The order in which the designs were presented to the child was the same as in the original study, with the designs being presented in four sets, five pairs in each set.

Questions and comments were developed for use in familiarizing the child with one of each of the paired designs (See Appendix B). The experimenter first asked, "What could this be?" If the child did not know or made no comment, the experimenter made a suggestion. If the child still offered no comment, the experimenter elaborated and again allowed time for the child to comment. After the designs in each set were discussed, the experimenter again named the five designs for the purpose of further familiarizing the child with them. The child then made his choices between the paired designs. An envelope containing a familiar design and one containing a "surprise" design (novel) were placed before him, and he was told to choose the one that he wanted. If the child hesitated, the experimenter asked if he wanted this one (the familiar) or a surprise one. The position in which the novel and familiar designs were placed for the child was the same as in the original study. The familiar design was placed on the

child's left in the first and third sets and on the child's right in the second and fourth sets.

Scoring

The scoring of the child's choices was the same as for the original study. In addition, the child's verbal contributions during the familiarization process were scored. On the score sheets (Figure 2 and 3), "A" indicates that the child immediately expressed an idea about the design, "B" indicates that he elaborated on the experimenter's first comment, and "C" indicates that he contributed after the experimenter's second comment. A, B, and C were arbitrarily scored three, two and one points, and the total gave the child a numerical score indicating the extent to which he had contributed during the familiarization process.


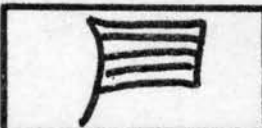



Results

The responses of the control and experimental children were compared. In Table III, the frequency of large and small D-scores are presented for the two groups. (The D-scores for the individual children are given in Tables VI and VII, Appendix A).

A Chi-square analysis of these data indicates that significantly more children in the experimental group had large D-scores. ($X^2 = 14.072$; $p < .001$). The refined

Name _____ Date _____ Code No. _____

Set I

1		A	B	C		F	N
2		A	B	C		F	N
3		A	B	C		F	N
4		A	B	C		F	N
5		A	B	C		F	N

Set II


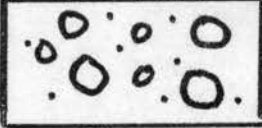



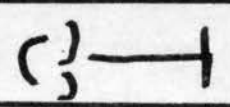


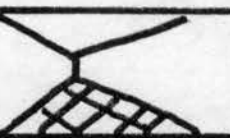

1		A	B	C		F	N
2		A	B	C		F	N
3		A	B	C		F	N
4		A	B	C		F	N
5		A	B	C		F	N

Figure 2. First page of score sheet for the refined instrument designed to measure curiosity in preschool children.

Set III

1		A	B	C			F	N
2		A	B	C			F	N
3		A	B	C			F	N
4		A	B	C			F	N
5		A	B	C			F	N

Set IV



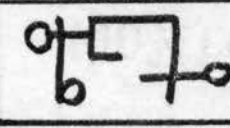


1		A	B	C			F	N
2		A	B	C			F	N
3		A	B	C			F	N
4		A	B	C			F	N
5		A	B	C			F	N

Figure 3. Second page of score sheet for the refined instrument designed to measure curiosity in preschool children.

instrument definitely has a greater discriminatory power than the original instrument as indicated by the much larger Chi-square.

TABLE III

FREQUENCY OF LARGE AND SMALL D-SCORES OBTAINED BY CONTROL AND EXPERIMENTAL GROUPS OF PRESCHOOL CHILDREN IN A TASK DESIGNED TO MEASURE PREFERENCE FOR THE NOVEL (EXPERIMENT II)
(N=58)

	D-Scores		Total
	0-4	5-20	
Control Group	22	7	29
Experimental Group	8	21	29

$X^2 = 14.072; p < .001.$

The internal consistency of the instrument was determined by means of a split-half correlation using the Spearman-Brown formula. For this analysis the number of novel choices in Sets I and II were correlated with the number of novel choices in Sets III and IV. The responses of 29 children in Experiment II yielded a correlation of $+0.841$ ($p < .01$), indicating that the instrument is reliable.

The relationship between the children's verbal contribution and their choices of the familiar and novel designs was analyzed by comparing the number of novel designs chosen by children whose verbal contributions were few

(0 - 39) and the number of novel designs chosen by children whose verbal contributions were many (40 - 60). The number of children with high and low verbal contribution scores and the total number of novel designs chosen by each group are presented in Table IV.

TABLE IV

TOTAL NUMBER OF NOVEL DESIGNS CHOSEN IN RELATION TO CHILDREN'S VERBAL CONTRIBUTIONS IN A TASK DESIGNED TO MEASURE PREFERENCE FOR THE NOVEL (EXPERIMENT II)
(N=29)

	Verbal Contribution Scores	
	0-39	40-60
Number of Subjects	10	19
Number of Novel Designs Chosen	71	231

$\chi^2 = 15.219; p < .001.$

A Chi-square analysis of these data indicates that novel designs were chosen much more frequently by those children who contributed many ideas during the familiarization process than were chosen by those children who contributed few ideas. ($\chi^2 = 15.219; p < .001.$)

There were too few children in the projected pilot study to justify analyzing for age and sex difference.

Summary

A research instrument for the measurement of preference for the novel, which is considered an aspect

of curiosity, was developed for use with preschool children and was administered to 60 girls and 60 boys who ranged in age from three years zero months through five years eleven months. The validity of the instrument was demonstrated by a comparison of the responses of children in the experimental and control groups. Adequate internal consistency of the instrument was demonstrated by a split-half correlation. No sex differences in preference for the novel were apparent but there was a tendency for older children to prefer the novel more than younger children.

The research instrument was refined, and administered to 29 children. The data from this projected pilot study was treated in the same way that the original data had been treated. The refined instrument proved to be valid and reliable, and it proved to have much greater discriminating power than the original instrument.

An additional analysis was possible in this projected pilot study. The children's choices of the familiar and novel designs were studied in relation to their verbal contributions during the familiarization process. Novel designs were chosen much more frequently by the children who made many verbal contributions.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this research was to investigate ways in which the curiosity of preschool children may be measured. The instrument which was developed measured one aspect of curiosity, that of preference for the novel.

The subjects were 168 preschool children ranging in age from three years zero months through five years eleven months. Individual children in experimental and control groups were matched on sex and age (within two months).

The instrument was composed of 20 pairs of designs, the two designs in each pair being equally attractive to the children. In each pair, one design was arbitrarily designated as familiar and the other as novel.

The experimental group of children were familiarized with one design in each pair and then were presented with a choice between the familiar design and a novel design. The control group of children were given an opportunity to choose between the paired designs without becoming familiar with either design before making this choice. A score, which indicated the child's preference for the novel, was figured by subtracting the number of novel designs chosen from the number of familiar designs chosen. The size of the

score indicated the extent to which the child was influenced by the familiar or novel designs, and the positive or negative sign indicated the direction of the influence.

The validity of the instrument was demonstrated by a comparison of the responses of the experimental and control children. This analysis indicated that the responses of the experimental children were not merely the result of chance but did indicate preference for the novel or the familiar ($X^2 = 4.631$; $p < .05$). The equal attractiveness of the paired designs was substantiated by a study of the choices of the control children. Adequate internal consistency or reliability of the instrument was demonstrated by a split-half correlation ($r = +.692$; $p < .01$). There were no significant sex differences, but there was a tendency for older children to choose the novel more than younger children ($X^2 = 5.538$; $p < .10$).

The research instrument was refined and administered to 29 children. The data from this projected pilot study was treated in the same way that the original data had been treated.

The refined instrument proved to be valid ($X^2 = 14.072$; $p < .001$) and reliable ($r = +.841$; $p < .01$), and it proved to have much greater discriminating power than the original instrument.

An additional analysis was possible in this projected pilot study. The children's choices of the familiar and novel designs were studied in relation to their verbal

contributions during the familiarization process. Novel designs were chosen much more frequently by the children who made many verbal contributions ($X^2 = 15.219$; $p < .001$).

Recommendations for Future Research

1. The revised instrument should be administered to a large group of children selected in such a way that the children's preferences can be analyzed for sex and age differences. The upper age limits for use of this instrument may be determined by using six and seven year olds in the study.

2. Other instruments for the measurement of curiosity should be developed since this instrument measures only one aspect of curiosity.

3. After further refinement, the instrument should be used in studies of the relationship between curiosity and the various aspects of creative ability. For example, in the present study the relationship between preference for the novel and verbal contributions suggests a relationship between curiosity and originality, which should be explored.

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APPENDIX A

TABLE V

AGE, SEX AND RAW SCORES OF INDIVIDUAL CHILDREN
 PARTICIPATING IN THE EXPERIMENTAL GROUP IN
 THE DEVELOPMENT OF AN INSTRUMENT
 DESIGNED TO MEASURE PREFERENCE
 FOR THE NOVEL (EXPERIMENT I)
 (N=120)

(Ages are expressed in years and months)

Child	Sex	Age	Number of Novel Chosen	D-Score
485	M	3:0	15	-10
*396	M	3:0	5	+10
*400	M	3:0	10	0
*397	F	3:0	9	+2
407	F	3:0	11	-2
409	F	3:0	5	+10
398	M	3:1	9	+2
395	M	3:2	12	-4
*394	M	3:2	13	-6
*393	M	3:3	10	0
*399	M	3:3	7	+6
412	F	3:3	9	+2
*408	F	3:3	9	+2
*401	M	3:4	10	0
403	F	3:4	9	+2
411	F	3:4	5	+10
410	F	3:4	8	+4
406	F	3:5	9	+2
*404	F	3:5	8	+4
*402	M	3:5	10	0
413	M	3:6	4	+12

TABLE V (Continued)

Child	Sex	Age	Number of Novel Chosen	D-Score
420	M	3:6	9	+2
180	F	3:6	6	+8
422	M	3:7	7	+6
419	M	3:7	4	+12
429	F	3:7	8	+4
426	F	3:7	14	-8
424	F	3:8	10	0
421	M	3:9	5	+10
418	M	3:9	9	+2
416	M	3:9	14	-8
*417	M	3:9	10	0
*415	M	3:9	9	+2
244	F	3:9	9	+2
423	F	3:9	11	-2
93	F	3:9	11	-2
429	F	3:9	6	+8
*414	M	3:10	8	+4
425	F	3:10	6	+8
428	F	3:11	8	+4
439	M	4:0	14	-8
437	M	4:0	7	+6
436	M	4:0	6	+8
*131	M	4:0	15	-10
*432	F	4:0	8	+4

TABLE V (Continued)

Child	Sex	Age	Number of Novel Chosen	D-Score
435	F	4:1	10	0
* 12	M	4:2	12	-4
323	F	4:2	14	-8
433	F	4:2	8	+4
*318	F	4:2	12	-4
306	F	4:2	8	+4
*440	M	4:3	11	-2
*431	F	4:3	10	0
*438	M	4:4	7	+6
*434	F	4:4	7	+6
* 47	M	4:5	8	+4
*177	M	4:5	11	-2
*453	M	4:5	5	+10
302	F	4:5	11	-2
*164	F	4:5	11	-2
455	M	4:6	13	-6
454	M	4:6	6	+8
217	M	4:7	6	+8
157	M	4:7	5	+10
450	M	4:8	19	-18
449	M	4:8	6	+8
230	M	4:8	5	+10
441	F	4:8	15	-10
444	F	4:8	8	+4
192	F	4:8	6	+8

TABLE V (Continued)

Child	Sex	Age	Number of Novel Chosen	D-Score
446	F	4:8	5	+10
289	M	4:9	7	+6
448	F	4:9	9	+2
78	F	4:9	6	+8
*451	M	4:10	7	+6
*452	M	4:10	8	+4
*443	F	4:10	3	+14
447	F	4:10	11	-2
193	F	4:10	8	+4
442	F	4:10	10	0
292	M	5:0	7	+6
462	F	5:0	11	-2
145	F	5:0	5	+10
49	F	5:0	13	-6
99	M	5:1	4	+12
*152	M	5:2	12	-4
294	M	5:2	2	+16
238	M	5:3	12	-4
457	M	5:3	17	-15
*204	F	5:3	13	-6
*307	F	5:3	7	+6
* 80	F	5:3	10	0
229	M	5:4	15	-10
458	M	5:4	10	0
459	F	5:4	3	+14

TABLE V (Continued)

Child	Sex	Age	Number of Novel Chosen	D-Score
156	F	5:4	11	-2
460	F	5:4	9	+2
174	M	5:5	9	+2
*461	F	5:5	8	+4
298	M	5:5	11	-2
*141	M	5:6	11	-2
*195	M	5:6	12	-4
*476	F	5:6	8	+4
*467	M	5:7	9	+2
300	M	5:7	0	+20
475	F	5:7	12	-4
471	F	5:7	11	-2
*474	F	5:8	15	-10
*468	M	5:8	12	-4
*464	M	5:8	12	-4
*469	F	5:9	5	+10
*214	M	5:10	10	0
*463	M	5:10	14	-8
*465	M	5:10	12	-4
*314	F	5:10	14	-8
*216	M	5:11	3	+14
*470	F	5:11	7	+6
*472	F	5:11	8	+4

TABLE V (Continued)

Child	Sex	Age	Number of Novel Chosen	D-Score
473	F	5:11	1	+18
129	F	5:11	5	+10

*Matched with a control child in the validity analysis

TABLE VI

AGE, SEX AND RAW SCORES OF INDIVIDUAL CHILDREN
PARTICIPATING IN THE CONTROL GROUP IN THE
DEVELOPMENT OF AN INSTRUMENT DESIGNED
TO MEASURE PREFERENCE FOR THE NOVEL
(N=54)

(Ages are expressed in years and months)

Child	Sex	Age	Experimental Group with which Matched Novel Chosen	Number of	D-Score
505	F	2:8	II	15	-10
500	M	2:10	I	9	+2
536	M	2:10	I	11	-2
514	F	3:0	I and II	10	0
510	M	3:3	I and II	10	0
531	M	3:3	I and II	10	0
527	F	3:3	I and II	11	-2
543	M	3:4	I	11	-2
517	M	3:4	I	9	+2
498	M	3:4	I	8	+4
508	F	3:5	I and II	10	0
541	F	3:7	II	10	0
176	F	3:8	II	17	-14
519	M	3:10	I and II	10	0
492	M	3:10	I	10	0
522	F	3:11	II	10	0
542	M	3:11	I	12	-4
477	F	4:0	I	15	+7
503	M	4:0	I and II	11	-2

TABLE VI (Continued)

Child	Sex	Age	Experimental Group with which Matched Novel	Number of Chosen	D-Score
79	M	4:1	I and II	-9	+2
529	F	4:2	I	-9	+2
537	M	4:3	I	-10	0
533	F	4:3	I and II	-10	0
29	M	4:4	I and II	-11	-2
499	M	4:4	I	-9	+2
507	M	4:5	I	-11	-2
513	F	4:5	I and II	-13	-6
497	F	4:5	I	-12	-4
506	M	4:6	I and II	-10	0
532	F	4:11	I and II	-10	0
495	M	4:11	I	-10	0
501	M	4:11	I	-9	+2
509	F	5:2	I and II	-10	0
148	F	5:2	I	-11	-2
34	M	5:2	I and II	-10	0
534	F	5:3	I	-11	-2
511	F	5:5	I and II	-13	-6
28	M	5:6	I and II	-12	-4
483	M	5:6	I	-8	+4
481	F	5:6	I and II	-14	-8
18	M	5:6	I and II	-8	+4
482	F	5:8	I and II	-12	-4
229	M	5:8	I	-10	0

TABLE VI (Continued)

Child	Sex	Age	Experimental Group with which Matched	Number of Novel Chosen	D-Score
213	M	5:9	I	10	0
528	F	5:9	I	5	+10
504	M	5:10	I and II	12	-4
319	M	5:10	I	8	+4
479	F	5:10	I and II	13	-6
215	M	5:11	I and II	10	0
221	M	5:11	I	11	-2
478	F	5:11	I	7	+6
480	F	5:11	I	10	0
523	F	6:3	II	12	-4
544	M	6:6	II	14	-8

TABLE VII

AGE, SEX AND RAW SCORES OF INDIVIDUAL CHILDREN
 PARTICIPATING IN THE EXPERIMENTAL GROUP IN
 THE DEVELOPMENT OF AN INSTRUMENT DESIGNED
 TO MEASURE PREFERENCE FOR THE NOVEL
 (EXPERIMENT II)
 (N=29)

(Ages are expressed in years and months)

Child	Sex	Age	Number of Novel Chosen	D-Score	Verbal Contribution
494	F	2:10	2	+16	-27
520	F	3:1	20	-20	0
525	M	3:1	11	-2	.5
430	M	3:3	7	+6	-40
535	F	3:3	2	+16	27
484	F	3:5	7	+6	40
496	F	3:6	17	-14	40
491	F	3:7	18	-16	-57
538	M	3:10	1	+18	-32
515	F	3:11	8	+4	30
84	M	4:0	8	+4	-42
466	M	4:2	11	-2	-20
205	F	4:3	3	+14	-59
187	M	4:4	14	-8	-56
40	F	4:5	12	-4	-53
493	M	4:6	7	+6	-24
512	F	4:10	12	-4	55
203	F	5:1	13	-6	-55
153	M	5:4	0	+20	-18
143	F	5:6	17	-14	-59

TABLE VII (Continued)

Child	Sex	Age	Number of Novel Chosen	D-Score	Verbal Contribution
516	M	5:6	9	+2	34
521	M	5:6	16	-12	56
160	M	5:6	20	-20	49
167	F	5:8	19	-18	58
539	M	5:10	9	+2	50
527	F	5:10	1	+18	55
530	M	5:11	18	-16	58
26	F	6:4	14	-8	48
106	M	6:5	6	+8	57

APPENDIX B

COMMENTS AND QUESTIONS FOR THE REFINED INSTRUMENT
DESIGNED TO MEASURE CURIOSITY IN
PRESCHOOL CHILDREN.

I have a picture game to play with you. There are all kinds of pictures that we can talk about. You may even choose your favorite pictures to take home and maybe you'll want to tell your mother a story about them.

Set #1

1. A. What could this be?
B. It could be the sun.
C. I wonder - do you suppose it is early in the morning and the sun is just coming up?
2. A. What do you suppose this is?
B. It could be a flag.
C. Do you suppose it could be flying from a flagpole and the wind is flapping it around?
3. A. Can you think of something this could be?
B. It might be waves.
C. Do you think the wind is making the waves big?
4. A. What is this?
B. It could be a tablecloth.
C. Do you think Mother might have dinner ready?

5. A. I wonder what this might be?
- B. It could be a flower.
- C. I wonder - do you think someone has picked it off its stem?

Set #2

1. A. What do you suppose this is?
 - B. It might be two streets that cross each other.
 - C. Do you suppose those dots could be people?
2. A. What could these be?
 - B. They could be bubbles.
 - C. I wonder - do you think someone is blowing them way up in the air?
3. A. This is a funny one. What do you think it is?
 - B. It could be a man.
 - C. Do you suppose someone just forgot to draw his face?
4. A. What could this picture be?
 - B. It could be some moons and a star.
 - C. Do you think that the moons are smiling at the star?
5. A. Can you think what this might be?
 - B. It could be some kind of a house.
 - C. Do you suppose it could be an Indian house?

Set #3

1. A. What might this be?
B. It could be a tree.
C. Do you suppose it might have lots of leaves on it?
2. A. Can you think of something this might be?
B. It might be steps.
C. Could the steps be going upstairs in a house?
3. A. What do you suppose these are?
B. They might be flowers.
C. Do you think these flowers might be in a flower garden?
4. A. Hmm - wonder what this could be?
B. It could be a room.
C. Do you suppose it could be the kitchen and the floor has just been scrubbed?
5. A. What do you suppose this is?
B. It could be a wheel.
C. Could it be a wheel on Daddy's car?

Set #4

1. A. This is a silly one - What do you suppose it could be?
B. It could be a spider coming down from the ceiling.
C. Do you suppose that's the spider that frightened little Miss Muffet away?

2. A. What could this be?
B. It could be someone putting his foot in the water.
C. I wonder - do you think someone is going wading?
3. A. My goodness - what is this?
B. It could be some tinker toys all stuck together.
C. Do you think they were trying to make a car?
4. A. What do you suppose this is?
B. It could be a big hill.
C. Do you suppose that a big rock rolled down the hill?
5. A. What is this?
B. It could be a star.
C. Do you suppose that it could be the star that we talk about in Twinkle, twinkle little star--
How I wonder what you are?

VITA

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Candidate for the Degree of

Master of Science

Thesis: THE DEVELOPMENT OF AN INSTRUMENT FOR THE
MEASUREMENT OF CURIOSITY IN PRESCHOOL CHILDREN

Major Field: Family Relations and Child Development

Biographical:

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