THE EFFECTS OF STRUCTURE IN INSTRUCTIONS AND MATERIALS ON PRESCHOOLERS' CREATIVITY

by

Amy Jo Moore

Thesis submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Family and Child Development

APPROVED:

Janet K. Sawyers, Chair	Victoria R. Fu
James D. Moran III	Joseph W. Maxwell

Blacksburg, Virginia

May, 1982

ACKNOWLEDGMENTS

The development and completion of this thesis is the result of generous efforts offered by many people. I would like to thank my committee members, Janet Sawyers, (Chair), Joe Maxwell, Jim Moran and Vicki Fu. A very special thank you is expressed to Jim Moran whose guidance and support has proved that even a great sense of professionalism need not preclude those qualities of warmth, encouragement, and reinforcement, which are invaluable to graduate students involved in a masters program.

Deep appreciation is acknowledged to all those individuals affiliated with the Virginia Tech Lab program, preschool age and otherwise, who offered their support through sometimes conversing and sometimes listening.

A warm thank you is given to Tim and Richard for listening to my endless monologues concerning this thesis and for not getting mad when they couldn't watch T.V.

A heart-felt thank you is expressed to Barb Kersey, my first true friend in Virginia, who struggled with me through the good times and the bad, and even the unbelievable.

Finally, I want to thank my family, whose encouragement and advice were invaluable. A big hug and kiss is sent to my brother Jay, whose budding wisdom and ever-present sense of humor helped me through many a night. And, to my parents and favorite friends Nelwyn and Jerry, I give my love and thanks for the wonderful way they are and the beautiful way in which they have shared it with me.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

CHAPTER 1

Introduction

Within the last 30 years, creativity and it's related processes have steadily gained attention. While the body of research concerning creativity has generally focused on school-age children and adults (Edwards & Tyler, 1965, Haddon & Lytton, 1968, Ramey & Piper, 1974), efforts are currently being made to expand the knowledge of creativity as it relates to the preschool age child (Dansky & Silverman, 1975, Pepler & Ross, 1981, Smith & Dutton, 1979). Such information is important as it will help to clarify our understanding of children's abilities to think creatively as well as the particular factors influencing creative thought.

Creative thinking is vital to our society as we depend on unique and novel answers to solve present-day problems. Thus, the understanding of creativity in young children is potentially valuable in encouraging the development of creative thinking and problem-solving abilities. Starkweather (1971) contended that although every child is born with a creative potential, this potential is often stifled before the age of five. She, therefore, stressed the importance of studying the creative ability of infants and preschoolers so efforts can be made early in a child's life to encourage creativity.

The research on preschoolers' creativity has concentrated on possible influential factors such as the role of play (Pepler & Ross, 1981) make-believe (Dansky, 1980), direct handling of the materials (Goodnow, 1969), and amount of structure in the immediate environment

(Thomas & Derk, 1981). These questions have become particularly significant with the increase in parental concern regarding children's education and varying school curricula. This has led researchers to look for possible differences in creativity as caused by varying degrees of structure in specific curricula (Chattin-McNichols, 1981, Ogilvie, 1974). Findings in this area have not been conclusive.

Specific questions regarding the amount of structure in the environment and its subsequent effect on creativity have received recent attention (Chattin-McNichols, 1981, Dansky & Silverman, 1975, Thomas & Berk, 1981). In an extensive comparison of four preschool curricula Miller and Dyer (1975) found that children who attended a DARCEE or Montessori program performed significantly better on the Dog and Bone test of innovative behavior than did children who had attended a Bereiter-Engleman or Traditional preschool program. In contrast, Chattin-McNichols (1981) asserted that preschoolers from traditional nursery schools performed better on Torrance Tests of Creative Thinking than did children from a Montessori environment. Still another view is presented by Ogilvie (1974), who characterized the most conducive environment for creativity as mid-road between more structured and less structured. It is difficult to compare the findings or draw conclusions from the various studies due to differences in age of participants, the instruments used, teaching style, and a variety of other factors.

Two of the factors which the various curricula differ on are materials used and the type of instructional methods employed. There

are various applications of Montessori's philosophy but typically the didactic materials and instructional methods are viewed as highly structured (Feeney, 1979). In contrast, "Traditional", "Open", and "Informal" classrooms have generally been seen as employing less structured materials and methods (Chattin-McNichols, 1981, Miller & Dyer, 1975). In an effort to minimize the difficulty of controlling for confounding factors involved in studies comparing program models, the present study focused on the factors of structured and unstructured instructions and materials. The purpose of the study was to evaluate the effects of structured instructions and materials on preschoolers' creativity, as measured by ideational fluency.

Specific Hypothesis

1) It is expected that participants under the condition of more structured instructions will exhibit less ideational fluency and less originality than participants under the conditions of less structured instructions.

2) It is expected that participants under the condition of more structured materials will exhibit less ideational fluency and less originality than participants under the condition of less structured materials.

CHAPTER 2

Review of Literature

Problems in Defining Creativity

Since creativity research began there has been a continuing controversy concerning its definition. This becomes a special problem when studying creativity in young children. The debate, simply stated, revolves around whether creativity is a process or a product. Torrance (1963) believes creative thinking is:

> "the process of sensing gaps or disturbing missing elements; forming new hypotheses concerning them; testing these hypotheses and communicating the results, possibly modifying and restoring the hypotheses." (p. 80)

Although Torrance began his definition by emphasizing the process of thinking he ended by stressing the communication of the results, i.e. the product of the process. Barron and Harrington (1981) added another dimension to the process-product question by defining creativity as an attitude or a disposition. Thus, there are three ways in which to conceptualize creativity: as a product, as a process, and as a personality trait. These concepts are not mutually exclusive.

One area which has been researched and could be considered process related is the area of problem-finding (Getzels & Csikszentmihalyi, 1966). Unfortunately, no one has been able to actually specify what events take place between the onset and the conclusion of a creative thought, making the measurement of the process difficult.

When viewing creativity as a personality type, questions which often arise concern whether or not the creative characteristics are innate, learned, or spontaneous reactions to the immediate environment. Research on creativity as a personality trait has been far from consistant when considered developmentally. Creative children have been described in terms of being independent, nonconforming in their actions and thought, highly sensitive to their environments, and more sociable and easy-going, whereas creative adults have been labeled as more withdrawn, rigid, and anxious than their peers (Arasteh, 1968). Thus, either the nature of creativity changes developmentally or social expectations for defining creativity alter with age.

When dealing with creativity as a product, disagreements ensue regarding the terms by which the products are to be judged as well as who is qualified to carry out the judging (Arasteh, 1968). In many ways creativity in children must be measured differently than creativity in adults. For example, an adult product might be a novel invention or a technological breakthrough in science while a child product might be a novel use for a cardboard box or an elaborate make-believe world. If creativity is defined as socially useful products (Moran, Sawyers, Fu, Milgram, Note 1) we must consider the social realm of comparison. Whereas for adults we might demand that the products contribute to society as a whole, a child's creativity might only be evidenced within that child's social environment. As a result, the definition of creativity, as with any construct, has been confined to those areas

which are measurable. Thus, most tests define creativity as a product and measure creativity largely in terms of number of responses.

Problems in Distinguishing Creativity from Intelligence

Another problem in studying creativity has been the absence of a distinction between creativity and intelligence. Guilford's (1956) contribution in clarifying this area has been significant. He concentrated his efforts on three cognitive areas: the processes carried out, the contents to which the processes are applied, and the products that result. The area of processes was further divided by Guilford into three categories: raw information material (cognition and memory), producing more information from existing material (convergent and divergent thinking), and evaluating the information which confronts us (evaluations). Stemming from this research, the major emphasis has been on divergent thinking. This mode of thinking is viewed as "searching for material that is only loosely related to what is already known," as opposed to convergent thinking which is seen as zeroing in on the implied answer (Wallach, 1970, p. 1213).

Guilford (1962) categorized divergent thinking as being composed of three parts: fluency, flexibility, and originality. Of these three components, it is believed that fluency, more specifically ideational fluency, best reflects a measure of creativity. It is certainly the easiest to measure and has been used extensively in the literature (e.g., Torrance, 1974; Wallach & Kogan, 1965).

Mednick (1962), in discussing the Associationist Theory of Creativity, asserted that creativity depends on the size and quality of

a person's association reservoir as well as the inter-relationship of a person's creative ability with the specific environment influencing that person. He postulated that stronger associates (popular responses) are more likely to occur in the beginning of a response sequence whereas more unusual or unique responses are more likely to occur later in the sequence. Wallach, in expanding on Mednick's theory, asserted that ". . .the more plentiful the person's flow of ideas, the more likely he [or she] is to hit upon original ones" (Wallach, 1970, p. 1223). Wallach (1970) cited a number of studies which support the independence of creativity and intelligence. He maintained that intelligence is best measured by convergent thinking while creativity is best reflected by divergent thinking. Moreover, measures of creativity must be distinguishable from (i.e., uncorrelated with) measures of intelligence.

Problems in Researching Factors Influencing Creativity

Arasteh (1968) has listed gender, age, birth order, cultural influences and parent-child relationships as factors studied in relation to creativity. Starkweather (1964) has suggested that intellectual and motivational characteristics also affect creativity. These characteristics include conformity, curiosity, freedom of response, playfulness, and willingness to try the difficult.

One factor which has been identified as relevant to the creative process in young children is the opportunity to interact with the materials (Dansky & Silverman, 1975, Goodnow, 1969). Goodnow found that kindergarten children who handled the materials gave significantly more nonstandard uses for a kleenex, paper clip, and screwdriver than

did children who only viewed the objects. Dansky and Silverman (1975) found preschoolers in a play condition (participants allowed free play with materials) exhibited significantly more standard and non-standard uses for various objects than preschoolers in an imitation condition (participants asked to use the material exactly as the researcher had) or an intellectual condition (participants asked to listen to verbal clues given by the researcher and then choose the object the researcher was thinking of).

In a similar study, Sylva, Bruner, and Genova (1976) measured creativity by studying the problem-solving abilities of children aged three to five years who were in one of three groups: a no-treatment condition, a play experience condition, and a condition which allowed for the observation of a rule necessary to complete a given task. Their findings support the notion that superior problem-solving is exhibited by children who have had actual play experience. They found this group to exhibit more goal-directed responses, need fewer number of hints, and consequently to be able to move more often from a simple to a complex behavior. Vandenberg (Note 2), as cited in the Pepler and Ross study (1981), found comparable results when a play experience group performed better on creativity tasks than an instructional group. Smith and Dutton (1979), in a study with four-year-olds, found play experience to be more helpful in problem-solving which necessitated innovative transfer than direct training. Dansky (1980) suggested that innovative problem-solving is fostered by active manipulation of objects. Therefore, the handling of objects in an unrestricted play setting appears to allow children greater access to creativity.

The type of available play materials has also been studied as it relates to creativity. Pepler and Ross (1981) studied the effects of convergent and divergent play materials on creativity in three- and four-year-olds. The convergent play condition and problem solving tasks were designed to elicit single solutions whereas the divergent materials and problems were designed to generate multiple solutions. They found the group which had experienced the divergent materials to perform better on the divergent tasks than either the control or the convergent materials group. In dealing with the convergent tasks the group which experienced the convergent materials was found to display more strategy-based moves than either of the other two groups. It, therefore, appears that creativity is affected by the amount of structure built into the materials.

The effect of a structured environment versus a non-structured environment on creativity in older children has also been investigated. Haddon and Lytton (1968) contrasted the development of divergent thinking abilities in English students from formal and informal schools. They described a formal school as a "traditional school which places emphasis upon convergent thinking" and an informal school as a "progressive school where the emphasis is upon self-initiated learning and creative activities" (p. 172). Haddon and Lytton matched their subjects on verbal reasoning quotient (IQ) as well as on socioeconomic status. They utilized verbal and non-verbal tests adapted from the Minnesota Tests of Creative Thinking by Torrance. Their results indicated that 11- and 12-year-old students from informal school environments exhibited a significant superiority in divergent thinking abilities compared to

their counterparts in formal school environments. Four years later a follow-up study revealed that the children who had attended the informal primary school retained their superior performance on divergent thinking tests, regardless of their secondary school environments (Haddon & Lytton, 1971).

Ramey and Piper (1974) present contrasting findings of a study with American schools on the effects of traditional versus open classrooms on creativity. Operationally, they defined a traditional school environment as one "which stresses competence, obedience, and hard work," and an open classroom environment as one which claims to "not only amass knowledge, but also develop critical techniques of inquiry" (p. 558). Children from grades 1, 4 and 8 were tested on both verbal and figural creativity using measures extracted from Torrance's Test of Creative Thinking. The results indicated that figural superiority was shown by children from the open classroom setting, while verbal superiority was exhibited by children from the traditional setting. They offered justification for the results by highlighting the differences in the curriculum models: a traditional classroom emphasizes both individual assignments and verbal interactions with the teacher, therefore, stressing language advancement, while an open classroom concentrates on peer interactions which consequently provide less advanced models of language use.

Andalman (1977) assessed the effects of three varying curricula on the socio-dramatic play of preschoolers. Children from the unstructured, child-centered group were role oriented, highly imaginative,

argumentative, idiosyncratic, and unconstrained by external demands. In contrast, the children from the structured, child-centered group were task oriented, imitative, cooperative, goal oriented, and anxious to please. The third group of children who were from a Montessori, academically-oriented program were prop oriented, cooperative, creative on a reality based level and extremely verbal. Therefore, it appears that differing levels of structure in the environment have a noticeable effect on children's creativity.

Ogilvie (1974) has suggested that neither a structured nor an unstructured environment is most conducive to creativity but rather an environment which rests midway along the continuum. She concluded that creativity was best facilitated by an environment which allows for freedom of expression as well as good quality association reservoirs. Thomas and Berk (1981) suggested a similar idea, citing evidence from their research with first- and second-grade children from informal, intermediate, and formal school settings. To obtain classification of the school settings a school rating procedure was used which included interviewing each teacher on his or her curriculum and rationale of teaching as well as rating the school descriptions on ten dimensions. Torrance's Thinking Creatively with Pictures was used to collect data from the participants and their parents, while the participants' teachers completed Wallach and Kogan's Behavior Rating Scale. Results indicated that the greatest increase in creativity resulted from the environments labeled intermediate, and the girls profited more from the intermediate and informal environments than the boys. Therefore,

the evidence suggests that creativity is influenced by the amount of structure in the environment.

Summary

In general, the study of creativity has been made difficult by the lack of a precise definition and clear understanding of it's influencing factors. Age differences in individuals studied have also added to the problems associated with measuring creativity. Although various curricula have been compared to assess their influence on creativity, few studies have focused on specific characteristics within the curriculum models. More research is needed to evaluate specific curriculum differences and their effect on creativity.

CHAPTER 3

Methodology

Subjects

The sample for this study consisted of 32 children who ranged in age from 41 to 59 months with a mean age of 51 months. There were 15 males and 17 females. All of the children were enrolled in a laboratory school program at Virginia Polytechnic Institute and State University and were voluntary participants in the study.

Instrumentation

Covariates. The Information Task from the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Wechsler, 1967) was used to obtain a measure of intelligence. A three dimensional patterns task (Appendix A), derived from Moran, Milgram, Sawyers, and Fu (Note 3), was used as a measure of ideational fluency to assess a baseline creativity score. In an effort to equalize the four groups on intelligence and baseline creativity, the mean scores obtained from the measures administered in session one were used as the basis for group assignment.

Creativity Measures. To assess creativity as affected by the specific experimental conditions, portions of a Lego Universal Building Set #110 were used. The two sets of seven lego pieces each were designated as Structured Materials and Unstructured Materials. The Structured Materials which formed the lego truck set, consisted of three red pieces (two which were 6.4 cm x 1.6 cm x 1 cm, and one which was 3.4 cm x 1.6 cm x 1 cm), one clear piece (3.4 cm x 1.6 cm x 1 cm), one blue piece (6.4 cm x 3.4 cm x 3/10 cm), and two black pieces

(1.6 cm x 1.6 cm x 1 cm) which had two wheels attached to each piece. It was assumed that the presentation of legos which included wheels would lead the child to build a vehicle or an object which moved. The Unstructured Materials which formed the lego airplane set, did not contain pieces with wheels and consequently was assumed to not imply the type of object to be built. This set of material included two blue and two white pieces (6.4 cm x .8 cm x 1 cm), one yellow and one clear piece (1.6 cm x 1.6 cm x 1 cm), and one yellow piece (1.6 cm x .8 cm x 1 cm) (see Appendix B).

Instructions. Two types of instruction sets were used. In the Structured Instructions set the examiner told the child the type of lego set being used (airplane or truck) and then built the appropriate object for the child. The materials used were those designated by the experimental condition which the child was in. The child was then asked to build the same object just as the examiner had. The Unstructured Instructions set did not include an explanation of the type of lego set being used or a building demonstration.

Experimental Groups and Sessions

A detailed description of the experimental conditions and sessions is shown in Table 1 and explained in greater detail in the procedure section. Each group was composed of eight children for a total of 32 participants. There was a two day lapse between sessions two and three and a three to ten day lapse between sessions three and four.

Table 1

Experimental Conditions for Subject Groups

in Sessions 2, 3 and 4

Group	Session 2	Session 3	Session 4
A	SI-SM	SI-UM	UI-UM
B	SI-UM	SI-SM	UI-UM
C	UI-SM	UI-UM	UI-UM
D	UI-UM	UI-SM	UI-UM

Note. The following abbreviations have been used in Table 1:

SI = Structured Instructions

UI = Unstructured Instructions

SM = Structured Materials

UM = Unstructured Materials

Materials used in session three were the reverse of those used in session two. Session three was administered to assess any possible effects of material type in a within-subjects design. Session four was administered in order to assess any long term effects from session two and session three.

Procedure

Prior to data collection the experimenter became familiar with the children in order to establish rapport and enhance cooperation. For all sessions the children were individually tested in a room adjacent to their classroom.

In the first session, the children were administered the Information task of the WPPSI and a three-dimensional patterns task. On this latter task the experimenter handed the child a three-dimensional piece of colored styrofoam and said:

> "Here is a shape. You can turn it anyway you'd like to. Tell me what you think it could be."

All responses were recorded by the experimenter. When a child stopped responding, questions such as "What else can you think of?" and "Is there anything else you can think of?" were asked. No time limit was imposed and the session continued until the child no longer gave responses. On the basis of the scores obtained in the first session the 32 children were assigned to one of the four experimental groups in an effort to equalize the group means on intelligence, baseline

creativity, and sex of child.

In the second session the children were taken to the testing room and shown a set of legos. The Structured Instructions group was shown the disassembled legos and the following instructions were told to them:

> "This is a lego airplane (truck) kit. I will show you how to build the airplane (truck)."

The experimenter then assembled the airplane (truck) in front of the child and then disassembled the object. The child was then asked to build the same object:

> "Now I want you to build the airplane (truck)."

Upon completion, the experimenter disassembled the object and said:

> "Tell me what else you could use these for."

All of the child's responses were recorded by the experimenter.

The Unstructured Instructions group was shown a set of disassembled legos and the participants were told:

> "Here are some legos. Tell me what you could use these for."

All of the children's responses were recorded by the experimenter. When a child stopped responding, the same questions which were used in the first session were used in the second. There was no time limit imposed and the session continuted until the child no longer gave responses.

Two days later a third session occurred in which the children received the same instructions (Structured or Unstructured) as they initially had but were exposed to the contrasting set of materials (Structured or Unstructured) (see Table 1). The procedure remained the same as in the second session. Between three and ten days later a fourth session took place in which all of the children received the Unstructured Materials and Unstructured Instructions. All of the children were told:

> "Here are some legos. Tell me what you can use these for."

Scoring

Scaled scores from the Information Task were used as the intelligence scores. According to the WPPSI Manual (Wechsler, 1967) a .71 correlation is found between Full-Scale Intelligence and Information scores.

For this study, ideational fluency was operationally defined as the total number of responses made by the child minus repeats. A repeat response was defined as any response given more than once in the same session. Originality was operationally defined by the statistical infrequency of a response, using Wallach and Kogan's (1965) model of scoring. They calculate statistical infrequency by using the populations' total number of responses, therefore, viewing an original response as one which is statistically uncommon in the population.

The present study utilized two different scoring systems, both based on Wallach and Kogan's definition of statistical infrequency.

Scoring system one calculated statistical infrequency by using each group as a population, thus scoring responses from a comparison of eight children. Scoring system two used a population of 16 children by combining the groups which had experienced the same instructions and materials. In both of these scoring systems only responses given by a single participant (i.e. unique responses) were considered to be original. Thus, the level of infrequency established for scoring system one was (12.5%, one in eight children) and in the second system it was placed at the 6% level (one in sixteen children).

CHAPTER 4

Results and Discussion

Results

The purpose of this study was to assess the influence of structure in instructions and materials on preschoolers' creativity. The following hypotheses were tested: 1) participants under the condition of Structured Instructions would exhibit less ideational fluency and less originality than participants under the condition of Unstructured Instructions, and 2) participants under the condition of Structured Materials would exhibit less ideational fluency and less originality than participants under the condition of Unstructured Materials.

The variables of age, intelligence, and baseline creativity were seen as relevant to any group differences and therefore were used as covariates in all of the analyses. Table 2 presents the means and standard deviations of the covariates for the four conditions. Analyses which appeared appropriate for this design were separate 2 (instructions) x 2 (materials) analyses of covariance (ANCOVA) for original and total fluency responses in session two and session three. For this, originality scores were analyzed using both scoring systems one and two, whereas on total fluency scores only scoring system one was used since the two systems yield identical data in this variable. Scores from session four were to be analyzed for long term effects of the independent variables if any of these analyses were significant.

The ANCOVA showed no significant effects for instructions, materials or the interaction between instructions and materials in

Table 2

Adjusted Group Means and Standard Deviations for Covariates

Group	Age (Months) $\bar{X}$	Age (Months) SD	IQ[a] $\bar{X}$	IQ[a] SD	Baseline Creativity $\bar{X}$	Baseline Creativity SD
A	38.75	6.90	13.12	2.90	6.38	3.62
B	50.75	5.26	13.75	3.01	5.88	5.14
C	52.88	4.01	13.12	1.64	6.62	5.01
D	50.62	4.47	13.50	2.78	4.88	2.23

[a]IQ = Scaled Scores from Information Subtest of WPPSI

either session two or session three under either scoring system one or two. See Appendix B for a summary of the ANCOVA tables. In the absence of significant effects we can investigate any possible trends in the main differences. Means for total fluency scores are presented in Table 3. Means for sessions two and three appear to indicate that the hypothesis that structured instructions would restrict responding is still tenable, albeit unconfirmed. In both sessions the means for the structured instructions groups (A and B) are less than the means of the unstructured instruction groups (C and D). Furthermore, these means, as well as the means for original scores (see Table 4), suggest that the second hypothesis (i.e. that structured materials will also restrict responses) is also still tenable, espcially under structured instructions. In this latter case, the unstructured materials used by Group B in session two elicited more responses than the structured materials of Group A. In session three, however, when the materials for the two groups are reversed, the mean total fluency and originality scores for Group A exceed that of Group B. Since the ANCOVAs were not significant one can only suggest that these hypotheses may still be tenable, with recognition that the data fail to give them support.

It should also be noted that test-retest effects led to a significant decrease in responses from session two to session three, as evidenced by a 2 (instructions) x 2 (order of presentation of materials) x 2 (sessions) repeated measures analysis of covariance. This particular

Table 3

Adjusted Group Means and Standard Deviations for Total Fluency Scores in Sessions 2, 3, and 4

Group	Session 2		Session 3		Session 4	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
A	5.12	3.48	4.62	3.20	5.50	3.51
B	6.00	3.62	3.12	1.55	3.25	1.28
C	7.50	6.32	5.50	2.33	5.00	2.14
D	7.50	5.76	5.25	3.37	3.62	1.69

Table 4

Adjusted Group Means and Standard Deviations for Originiality Scores in Sessions 2 and 3

	Session 2		Session 3	
Group	$\bar{X}$	SD	$\bar{X}$	SD
A	3.62	2.88	3.25	2.55
B	4.00	2.39	1.75	1.28
C	4.12	5.03	3.00	1.41
D	4.25	4.46	2.50	1.69

comparison, however, is not directly germane to the hypothesis. It should be noted though that repeated testing over a short time period seems to decrease responses.

Discussion

The findings of this study are difficult to discuss considering the data yielded insignificant results. Although speculation as to why the results were insignificant is also a difficult process, several explanations are possible.

One obvious interpretation of the results is that structure in instructions and materials does not have an effect on preschoolers' creativity. On the other hand, previous studies (Chattin-McNichols, 1981, Miller & Dyer, 1975, Ogilvie, 1974, Ramey & Piper, 1974, Thomas & Berk, 1981) have found that children in different curriculum models exhibit differences in creativity. It may be that instructions and materials are not the critical components distinguishing these curriculum models as they pertain to creativity and therefore significant effects as a result of these factors are not observable.

The fact that the experimental conditions were imposed for only a brief amount of time, in contrast to the constant environment of a preschool, may also account for the lack of significance. Thus, it is possible that the experimental conditions did not have a significant effect due to their brevity of exposure. The use of structured instructions appears to contradict the philosophy of the preschool curriculum from which the children were selected. Such a short

exposure to a different set of instructions may not be sufficient to over-ride eight months of programming. The school's deemphasis on correct responses using materials familiar to the children such as legos, may have attenuated any instructional or material differences in the experimental conditions.

The small sample size may also have been a critical factor. With only eight subjects per group, the statistical tests may have lacked adequate power to distinguish between the structured and unstructured conditions. Based on the mean differences between groups for total fluency scores in session two this is certainly a tenable hypothesis. The two groups with unstructured instructions had a mean score of 5.56 while the two groups with unstructured instructions had a mean score of 7.50. Thjs difference is also observable in session three with the structured instruction groups having a mean score of 3.87 and the unstructured instruction groups have a mean score of 5.38.

Similarly, noticeable differences were found in the variance of the total fluency scores of the unstructured instruction groups compared to the structured instruction groups. In session two the standard deviation for total fluency under structured instructions was 3.46 whereas the unstructured instruction group had a standard deviation of 5.84. With the small sample size these relatively large within-group variations may have made it difficult to obtain between-group differences.

CHAPTER 5

Summary, Conclusions and Recommendations

Summary

The purpose of this study was to examine the effect of structure in instructions and materials on preschoolers' creativity. Thirty-two preschool children were administered the WPPSI Information subtest and a three-dimensional patterns task. The children were then assigned to one of four conditions: Structured Instructions/Structured Materials; Structured Instructions/Unstructured Materials; Unstructured Instructions/Structured Materials or Unstructured Instructions/Unstructured Materials. Materials were reversed for session three with instructions remaining the same. Session four was administered to assess any carry over effects from session two and session three, and consisted of unstructured materials and unstructured instructions for all groups. Separate 2 (instructions) x 2 (materials) analyses of covariance were conducted for total fluency and originality scores in sessions two and three with age, intelligence, and baseline creativity serving as covariates. No significant effects were found in any of the analyses.

Conclusions and Recommendations

The major conclusion of this study is that structure in instructions and materials has no significant effect on preschoolers' ideational fluency. Various explanations for this finding include small sample size, familiarity with the materials used, the specific factors being assessed, brevity of the experimental condition, and orientation

of the particular preschool from which the sample was selected. Although the analyses were not significant, trends found in the mean differences suggest that the hypotheses remain tenable and may be confirmed in future studies with a more adequate research design.

Recommendations for future research include:

1) Research with larger sample sizes is necessary in order to assess the effects of structure in instructions and materials on preschoolers' creativity with adequate statistical power.

2) The development of a clear, widely accepted definition of creativity is necessary for the cohesiveness and advancement of creativity research.

3) A wider variety of tests and measurements could be used when assessing creativity thus reflecting a multidimensional definition. Reliance solely on ideational fluency appears to be an inadequate reflection of creativity, especially when considered from the process-product-personality framework.

4) A distinction between responses which are verbal and responses which are built as well as labeled verbally by the child is needed to clarify the dependent variable (ideational fluency) which is being assessed in this study.

Reference Notes

1. Moran, J. D. III, Sawyers, J. K., Fu, V. R., & Milgram, R. M. Measuring creativity in preschool children. Unpublished manuscript, 1982.

2. Vandenberg, B. The role of play in the development of insightful tool-using strategies. Paper presented at the meeting of the American Psychological Association, Toronto, August, 1976.

3. Moran, J. D. III, Milgram, R. M., Sawyers, J. K., & Fu, V. R. Original thinking in preschool children. Paper presented at the Southeastern Conference on Human Development, Baltimore, 1982.

References

Andalman, M. R. The effects of preschool environments on the socio-dramatic play of young children. Dissertation Abstracts International, 1977, 38, 2657-2658.

Arastah, J. D. Creativity and related processes in the young child: A review of the literature. Journal of Genetic Psychology, 1968, 112, 77-106.

Barron, F. & Harrington, D. M. Creativity, intelligence, and personality. Annual Review of Psychology, 1981, 2, 439-479.

Chattin-McNichols, J. P. The effect of Montessori school experience. Young Children, 1981, 36, 49-66.

Dansky, J. L. Make-believe: A mediator of the relationship between play and associative fluency. Child Development, 1980, 51, 578-579.

Dansky, J. L. & Silverman, J. W. Play: A general facilitator of associative fluency. Developmental Psychology, 1975, 11, 104.

Edwards, M. P. & Tyler, L. E. Intelligence, creativity and achievement in a nonselective public junior high school. Journal of Educational Psychology, 1965, 56, 96-99.

Feeney, S. & Christensen, D. Who am I in the lives of children: An introduction to teaching young children, C. E. Merrill Co., Col., Ohio, 1979.

Getzels, J. W. & Csikszentmihalyi, N. The study of creativity in future artist. In O. J. Harvey (Ed.), Experience, structure and adaptability. New York: Springer, 1966.

Goodnow, J. J. Effects of active handling, illustrated by uses for objects. Child Development, 1969, 40, 201-212.

Guilford, J. P. The structure of intellect. Psychological Bulletin, 1956, 267-293.

Guilford, J. P. Factors that aid and hinder creativity. Teachers College Record, 1962, 63, 380-392.

Haddon, F. A. & Lytton, H. Teaching approach and the development of divergent thinking abilities in primary schools. British Journal of Educational Psychology, 1968, 38, 171-180.

Haddon, F. A. & Lytton, H. Primary education and divergent thinking abilities: Four years on. British Journal of Educational Psychology, 1971, 41, 138-147.

Mednick, S. A. The associative basis of the creative process. Psychological Bulletin, 1962, 69, 220-232.

Miller, L. B. & Dyer, L. Four preschool programs: Their dimensions and effects. Monographs of the Society for Research in Child Development, 1975, 40, nos. 5-6.

Ogilvie, E. Creativity and curriculum structure. Educational Research, 1974, 16, 126-132.

Pepler, D. J. & Ross, M. S. The effects of play on convergent and divergent problem solving. Child Development, 1981, 52, 1202-1210.

Ramey, C. T., & Piper, V. Creativity in open and traditional classrooms. Child Development, 1974, 45, 557-560.

Smith, P. K., & Dutton, S. Play and training in direct and innovative problem solving. Child Development, 1979, 50, 830-836.

Starkweather, E. K. Creativity research instruments designed for use with preschool children. Journal of Creative Behavior, 1971, 5, 245-255.

Starkweather, E. K. Conformity and non-conformity as indicators of creativity in preschool children. Cooperative Research Project, No. 1967, U.S. Department of Health, Education, and Welfare, Washington, D.C., 1964.

Starkweather, E. K. Problems in the measurement of creativity in preschool children. Journal of Educational Measures, 1964, 1, 109-113.

Sylva, K., Bruner, J. S., & Genova, P. The role of play in the problem-solving of children 3-5 years old. In J. S. Bruner, A. Jolly, & K. Sylva (Eds.), Play--its role in development and evolution, Middlesex: Penguin, 1976.

Thomas, N. G. & Berk, L. E. Effects of school environments on the development of young children's creativity. Child Development, 1981, 52, 1153-1162.

Torrance, E. P. Education and the creative process. Minneapolis, Minn.: Univ. Minn. Press, 1963.

Torrance, E. P. Torrance Tests of Creative Thinking: Directions manual and scoring guide. Lexington, Massachusetts: Personnel Press, 1974.

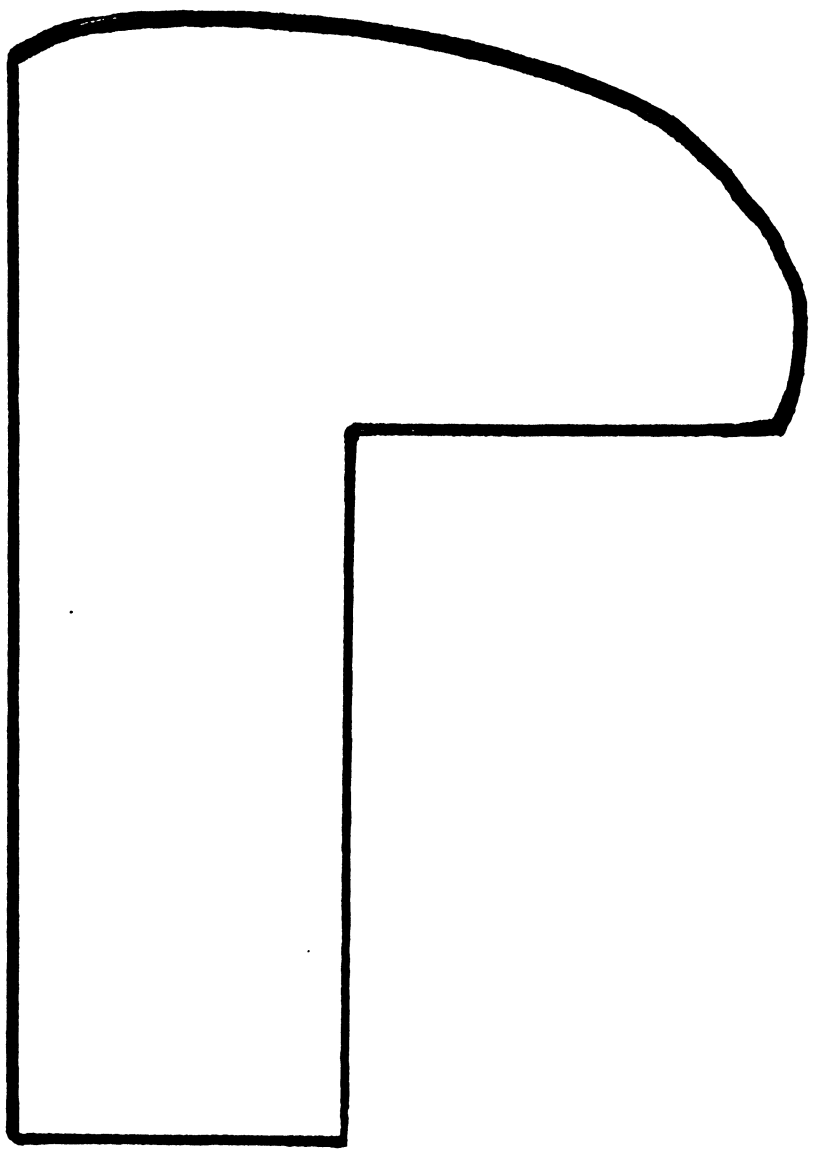
Wallach, M. A. Creativity. In P. H. Mussen (Ed.), Carmichael's manual of child psychology, Vol. I, New York: Wiley, 1970, 1211-1272.

Wallach, M. A. & Kogan, N. Modes of thinking in young children: A study of the creativity-intelligence distinction. New York: Holt, Rinehart, and Winston, 1965.

Wechsler, D. Manual for the Wechsler Preschool and Primary Scale of Intelligence. New York: Psychological Corporation, 1967.

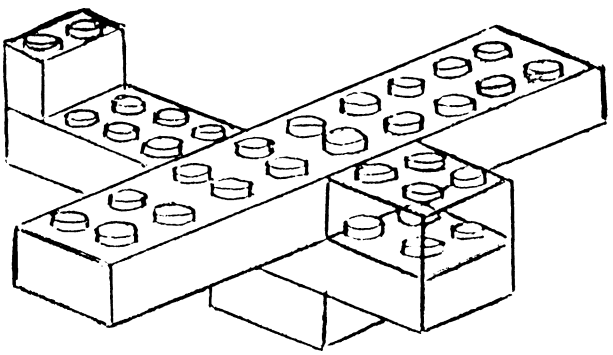
APPENDIX A

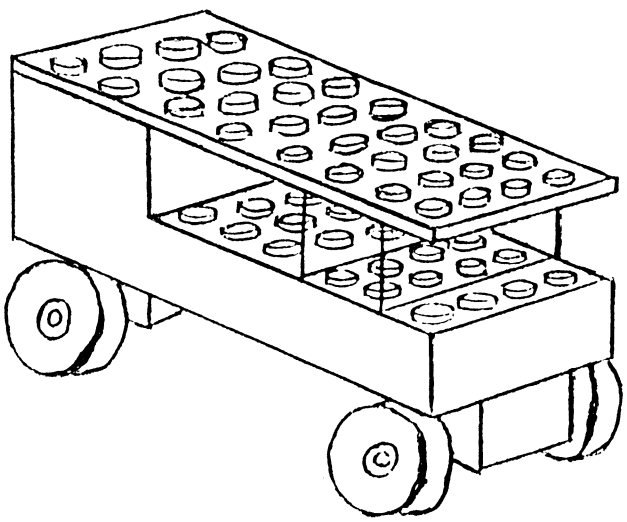
Three Dimensional Patterns Stimulus



APPENDIX B

Stimuli Used With Structured Instructions





APPENDIX C

ANCOVA Summary Tables

ANCOVA for Total Fluency on Scoring System 1

	df	F	p
Session 2			
Instructions	1, 25	1.12	.30
Materials	1, 25	.03	.85
Interaction	1, 25	.04	.83
Session 3			
Instructions	1, 25	.69	.41
Materials	1, 25	1.48	.23
Interaction	1, 25	1.27	.27

ANCOVA for Originality on Scoring System 1

	df	F	p
Session 2			
Instructions	1, 25	.31	.58
Materials	1, 25	2.58	.12
Interaction	1, 25	1.65	.21
Session 3			
Instructions	1, 25	.03	.86
Materials	1, 25	.00	.95
Interaction	1, 25	.03	.86

ANCOVA for Originality on Scoring System 2

	df	F	p
Session 2			
Instructions	1, 25	.02	.90
Materials	1, 25	.01	.94
Interaction	1, 25	.03	.86
Session 3			
Instructions	1, 25	.04	.85
Materials	1, 25	1.77	.20
Interaction	1, 25	1.00	.33

APPENDIX D

Data for Groups A, B, C, and D

Abbreviations to be used in Tables in Appendix D

Age:	Age in months
Sex:	1 = male 2 = female
IQ:	Scaled score on Information Subtest of WPPSI
BL Creat.:	Baseline creativity = Total fluency minus repeats on 3-D patterns task
YI:	Scoring System in 1 in which unique responses were determined within group of 8 participants
Y2:	Scoring System 2 in which unique responses were determined within group of 16 participants
S2:	Session 2
S3:	Session 3
QT:	Total number of unique responses
PT:	Total number of popular responses

Data for Group A

Subject Number	31	19	27	25	23	7	14	28
Age	42	49	45	44	59	57	53	41
Sex	1	2	2	1	2	2	1	2
IQ	9	16	13	15	9	16	12	15
BL Creat	1	5	2	7	1	2	9	7
Y1S2QT	1	5	2	7	1	2	9	7
Y1S2PT	0	1	2	0	1	0	2	1
Y1S3QT	2	6	5	2	9	0	6	4
Y1S3PT	0	1	1	0	2	1	2	2
Y2S2QT	1	5	2	7	1	2	8	6
Y2S2PT	0	1	2	0	1	0	3	1
Y2S3QT	2	6	4	0	7	0	4	3
Y2S3PT	0	1	2	2	4	1	4	3
Total Fluency	8	24	15	9	15	8	27	19

Data for Group B

Subject Number	30	09	2	24	20	15	26	17
Age	41	49	55	49	50	53	50	59
Sex	2	2	1	2	1	1	1	2
IQ	11	14	19	14	9	16	13	14
BL Creat	1	4	2	6	17	3	9	5
Y1S2QT	3	9	4	2	4	10	4	2
Y1S2PT	0	2	2	2	1	2	1	0
Y1S3QT	2	2	1	0	3	4	1	1
Y1S3PT	0	1	4	2	0	2	1	1
Y2S2QT	1	5	2	0	2	5	2	1
Y2S2PT	0	4	3	3	1	4	1	0
Y2S3QT	2	2	1	0	3	4	1	1
Y2S3PT	0	1	3	2	0	2	1	1
Total Fluency	7	19	14	10	13	20	1	7

Data for Group C

Subject Number	12	21	5	22	16	10	3	4
Age	52	54	57	46	54	59	51	50
Sex	1	2	2	2	1	2	1	1
IQ	12	15	13	13	10	15	13	14
BL Creat	3	3	4	4	6	18	9	6
Y1S2QT	3	0	18	4	1	5	2	6
Y1S2PT	3	2	4	3	1	1	4	3
Y1S3QT	5	3	4	5	2	3	5	4
Y1S3PT	1	1	5	1	0	0	2	3
Y2S2QT	3	0	16	2	1	5	3	3
Y2S2PT	3	2	5	5	1	1	3	5
Y2S3QT	3	3	4	3	0	5	3	3
Y2S3PT	3	1	5	3	2	1	0	4
Total Fluency	18	9	38	19	6	18	18	19

Data for Group D

Subject Number	29	18	32	1	13	8	11	6
Age	47	51	43	58	50	50	54	52
Sex	2	1	1	1	1	2	2	2
IQ	12	15	8	17	12	15	15	14
BL Creat	3	5	3	5	8	8	2	5
Y1S2QT	3	1	3	3	7	1	3	16
Y1S2PT	0	3	5	3	1	3	3	5
Y1S3QT	2	3	2	1	1	4	3	11
Y1S3PT	1	1	4	3	1	1	2	2
Y2S2QT	3	1	3	2	7	0	4	14
Y2S2PT	0	3	5	4	1	4	3	7
Y2S3QT	2	2	2	1	1	4	2	6
Y2S3PT	1	2	4	3	1	1	3	7
Total Fluency	10	8	16	12	14	15	15	43

APPENDIX E

Informed Consent Letter

INFORMED CONSENT LETTER

Dear Parents:

In February and March we will be conducting a research project in the Child Development Laboratory of Virginia Polytechnic Institute and State University. This project deals with creativity in preschool children and how it is influenced by various verbal instructions.

The experimenter will show your child a set of Lego building blocks and then verbally recite a set of pre-written instructions. Your child will then be given the opportunity to play freely with the legos. Each child will be seen individually and all information obtained will be confidential.

If you have any questions regarding this project or would like additional information please feel free to contact the researchers. If you do not wish for your child to participate please contact Dr. Sawyers. We will be glad to share the results with you upon completion of the project.

Thank you for your cooperation.

Sincerely,

Amy Moore
Graduate Student

Janet K. Sawyers
Assistant Professor

The vita has been removed from the scanned document

THE EFFECTS OF STRUCTURE IN INSTRUCTIONS AND MATERIALS ON PRESCHOOLERS' CREATIVITY

by

Amy Jo Moore

(ABSTRACT)

The purpose of this study was to assess the effects of structure in instructions and materials on preschoolers' creativity. Thirty-two children ranging in age from 41 to 59 months comprised four experimental conditions of Structured Instructions-Structured Materials, Structured Instructions-Unstructured Materials, Unstructured Instructions-Structured Materials, and Unstructured Instructions-Unstructured Materials. An effort was made to equalize the groups on intelligence and baseline creativity from scores obtained in Session 1 using the Information Task from the Wechsler Preschool and Primary Scale of Intelligence and a three-dimensional patterns task derived from Moran, Milgram, Sawyers, and Fu. In session two the children were administered the appropriate instructions and materials and two days later in session three given the same instructions with a reverse in materials. Session four was administered to determine any long term effects of session two and three and therefore consisted only of unstructured instructions and materials. Analyses which were used included a 2 (instructions) x 2 (materials) analysis of covariance performed separately for sessions two and three. All analyses were covaried

on age, sex, intelligence and baseline creativity. The results did not reach statistical significance, although mean differences suggest that structure in instructions and materials limit ideational fluency.