GENDER EFFECTS IN PRESCHOOL CHILDREN'S CREATIVITY

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Abstract

This experiment was conducted to determine if differences between the genders would be evidenced on measures of creative potential. The subjects were 58 children (31 boys and 27 girls) with a mean age of 57.6 months. The children were tested individually by one of three female examiners using the Multidimensional Stimulus Fluency Measure. This test consists of three measures: instances, pattern meanings, and alternate uses. No gender differences were evidenced on analyses of popular or original responses to the creativity measure.

GENDER EFFECTS IN PRESCHOOL CHILDREN'S CREATIVITY

Much has been written about creativity, as well as gender differences. However, few research studies have paired the two subjects. Modeling, gender-typed behavior, parental behavioral variables, and cognition may play a relevant part in understanding whether gender differences do exist.

Several theorists feel that the role of imitation and identification are important in the acquisition of a child's gender-typed behavior (Kagan, 1964; Kohlberg, 1966; Mischel, 1970; Mussen, 1969; Sears, 1965). Maccoby and Jacklin (1974) agree that observational learning does occur, and offer two explanations as to how children of both genders learn different things. They feel that the same-gender model is more available, and that children choose same-gender models because of the similarities between themselves and the model.

Edelbrock and Sugawara (1978) discovered that when preschoolers were tested by an opposite-gender experimenter, both boys and girls adhered to gender-appropriate items, and avoided items that were gender-inappropriate. This finding could have a bearing on activities and behaviors of children at preschools and day care centers, since the majority of caretakers are female. Edelbrock and Sugawara also found that boys were more stereotyped than girls.

Block (1983) summarized that there appears to be appreciable gender-differentiated socialization at home and school.

Block found that boys' toys, more often than girl's toys, afforded inventive possibilities, encouraged manipulation, and provided more explicit feedback from the physical world. Girls' toys were found to encourage imitation, and provided less opportunity for variation and innovation. Block suggested that girls, more than boys, are socialized in ways encouraging the use of assimilative strategies for processing new information, while boys are socialized in ways that encourage the use of accommodative strategies when processing new information.

Smith and Daglish (1977) discovered from a questionnaire that parents rated active play, play with transportation toys, aggressive behavior, and exploring behavior as typically masculine behaviors. The authors concluded that stereotyped views of gender-typical behavior are clearly seen in many parents, and these views are partly grounded in actual behavioral differences between boys and girls.

Many of the studies cited do not disregard inborn gender differences as being present. These studies do suggest that gender differences present at birth can be magnified by the child's environment throughout his or her early years. The connection between gender differences, inborn and magnified through socialization practices, and cognition and creativity might be an important one. More specifically, parental behaviors could contribute to certain gender behaviors, which in turn could influence creative potential. Unfortunately, few research studies have focused on the area of gender differences and their relationship to creativity.

Wallach (1970) credits J. P. Guilford and his associates as being some of the first creativity researchers. Guilford believed that the most obvious indications of creativity are found in divergent thinking, which is the process of searching for material that is only loosely related to what is already known, so that the mind is free to think in several different directions. Guilford believed that ideational fluency was a subprocess of divergent thinking. Ideational fluency, according to Guilford, refers to the ability to generate ideas that will fulfill particular requirements, such as naming uses for bricks.

Mednick (1962) postulated a response hierarchy, in which during a testing process, a person will give usual, more mundane responses first, and then more creative, unique responses afterwards. The creative individual, according to Mednick, will be less fixated upon the common associations to an idea and be more capable of reaching the distant associations.

Starkweather (1964) was one of the pioneers in recognizing the need and importance of measuring creativity specifically in preschoolers. Starkweather believed that the materials used in creativity studies with older children were inappropriate for preschoolers because of the two-dimensional aspect of the material. Young children needed to be able to handle the materials. To remedy this problem, Starkweather devised a measure of simple, three-dimensional objects cut into styrofoam shapes, which she used in her studies. Moran, Milgram, Sawyers, and Fu (1983) adapted

Starkweather's materials, and found that three-dimensional stimuli were more appropriate measures of original thinking in preschool children than those consisting of two-dimensional stimuli. Another finding to surface from this study was that boys generated more original ideas than girls, so the possibility of gender differences relating to creativity was mentioned in one of the few times this issue has been addressed in preschoolers.

Sawyers, Moran, and Tegano (1987) have devised a theoretical model of creative potential in young children. These authors conceptualize that there is a developmental progression in creative behaviors. For young children, the criterion is originality; for older children, the component of quality is added; and for adults, the criterion also includes significance. In this model, cultural and biological factors, such as lifestyles and gender, can have a direct bearing on contextual factors, such as teacher and parent behavior. Also, cognitive processes, such as convergent and divergent thinking make an impact on the ideational fluency present in a child.

After reviewing the previous studies on socialization practices, it seems that a study determining if there are gender differences related to creativity would be an important one. At this point, no attempt to ascertain the causes (e.g., biological or socialization) will be made.

Method

Subjects

The subjects were English-speaking preschool children in Stillwater, Oklahoma, enrolled in the Oklahoma State University Child Development Laboratory School. A total of 58 subjects participated in the study, 31 boys and 27 girls, with a mean age of 57.6 months (Range: 3 years, 10 months to 6 years, 0 months). Mean age for boys was 58.5 months, with the mean age for girls equal to 56.6. months. This sample included a 7% minority population. Laboratory school children excluded from the study were those who were under the age limit of 45 months, or international children who had been in the United States for less than one year. The reason for this exclusion was to provide some control of verbal ability in English with the international children.

Materials/Stimuli

The Multidimensional Stimulus Fluency Measure (Moran, Milgram, Sawyers, & Fu, 1983) for ideational fluency was used. This test consists of three measures, instances, pattern meanings, and alternate uses, with two items per measure. In the instances task, the stimulus items are things that are red and things that are round. Subjects are asked to name all the items they can think of that have the specific features named. In the pattern meanings task, three-dimensional, various-colored styrofoam shapes are used. The child is asked what kind of objects the shapes could represent. In the alternate uses task, the child is asked to name all the various uses of a box, and then, paper. (See Appendix B).

Procedure

The testing was completed over a five-week period, and was done in the mornings, during the children's self-select activity times. Each child was given the Multidimensional Stimulus Fluency Measure individually by one of three female examiners in a room relatively free from other stimuli. No child was forced to participate in the study. Each session took approximately 15-20 minutes, or as long as the child generated responses. There were no time limits for the children's responses.

There were two testing sessions, approximately two weeks apart, for each child. In session one, instances and patterns were given. The alternate uses measure was administered in the second session. The children had a different examiner for each session.

During the examining sessions, all of the children's responses were written down by the examiners. The examiners did not voice any approval or disapproval regarding the children's responses. The sessions were also tape-recorded, in order to aid the coding process. The children were assigned numbers for coding, and these numbers were used exclusively on the data sheets and tape recordings.

Results

The data was analyzed using a 2 x 3 repeated measures analysis of variance with gender as the between group variable and task (instances, patterns, and uses) as the within group variable. Three separate ANOVAs were conducted with either original, popular, or total fluency scores operating as the dependent variable.

Additional 2 x 2 repeated measures ANOVAs were conducted for items within each task, (e.g., with gender as between group; box and paper as within group). Each of these analyses was conducted for each of the three dependent variables: original, popular, and total fluency scores.

Since original scores are considered the most crucial on the Multidimensional Stimulus Fluency Measure, only original scores are discussed here. (See Appendix E for information on popular and total fluency scores). None of the other analyses, including those on popular and total fluency scores, showed significance related to gender. For original scores, only the gender x task analysis yielded close to significant data regarding gender effects. On the 2 x 3 ANOVA for original scores, there is a significant effect of task, $F(2,55) = 13.06$, $p < .001$, although this difference is not pertinent to the present study and is consistent with previous published data on this instrument. The gender x task interaction only approached significance, $F(2,55) = 2.73$, $p < .08$. The latter effect results from a higher mean score for boys on the Uses task, and girls providing a slightly higher mean score than boys on the Patterns task with no mean differences evidenced on the Instances task (See Table 1).

Insert Table 1 about here

Discussion

The results obtained in this study did not support the expectation that preschool boys would demonstrate more original responses on a creativity measure. It is not clear as to why the expected results did not materialize.

Many of the arguments used to demonstrate the plausibility of the hypothesis involved socialization practices and modeling. Yet, Maccoby and Jacklin (1974) maintain that if a child does not perform actions that have been suggested through observational learning, the reason might be that the necessary eliciting conditions did not occur. Perhaps, this theory could have a bearing on the present study, in that no eliciting conditions did occur. Since the Multidimensional Stimulus Fluency Measure is designed to be neutral and not gender-biased, the children did not have an outlet in which to demonstrate learned gender-appropriate behaviors. Even if the children demonstrated learned gender-appropriate remarks, they would have no bearing on the results, unless the remarks were scored as original ones. Also, the Multidimensional Stimulus Fluency Measure was performed under conditions which do not allow feedback for responses. The children could not elicit gender-appropriate remarks from the three female examiners, because of the neutrality of their positions.

Other arguments used to defend the hypothesis involved the different socialization practices with the two genders. Smith and Daglish (1977) found that stereotyped views of gender-typical behavior are clearly seen in many parents. However, these researchers concede that although parental stereotyped views are partly grounded in actual behavioral differences between girls and boys, parents probably tend to exaggerate such differences. It must also be taken into account that roughly ten years have passed since these studies were performed. Due to increased publicity through the media and written sources about stereotypical labels and treating the genders equally, it seems likely that parents, and especially teachers, are more knowledgeable about and are less apt to promote differential socialization of the genders. This factor could have influenced the present study. Since the majority of the subjects have been in the university lab school for several years, they might not have been exposed to a great amount of differential socialization practices, due to the educated practices of the teaching staff and the relatively homogeneous nature of the parent population. Perhaps a sample of children from a different environment would have yielded different results.

Regarding creativity studies, it is not clear why this study did not find the same results as the Moran, Milgram, Sawyers, & Fu (1983) study. In the Moran, et al. study, preschool boys generated more original ideas than preschool girls, after comparing two-dimensional stimuli to three-dimensional stimuli. Since the present study also used three-dimensional stimuli, one is hard-pressed to speculate on why there were different results. It is especially puzzling since the females in the present study actually had a higher mean score on the Patterns task than males.

Perhaps the best guess, at this point, is that the findings from the previous study were specific to that sample and that gender differences in creative potential, as measured by the Multidimensional Stimulus Fluency Measure with middle-class samples, do not exist. This is not to imply that gender differences do not play a part in other components of creativity.

Regarding the Sawyers, Moran, and Tegano (1987) model, perhaps this study has shown that there are not gender differences in preschoolers' creative potential. Whether differences arise at later stages of development when other factors gain more influence (e.g., personality factors such as conformity and risktaking during the self-evaluation process postulated for elementary school children) is still unanswered and a topic worthy of continued investigation.

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Table 1

Means and Standard Deviations for Original Scores by Task and Gender

	Task		
Gender	Instances	Patterns	Uses
Male	7.16 (7.60)	4.67 (3.71)	3.74 (5.26)
Female	7.26 (5.60)	6.00 (3.80)	2.41 (2.25)

Appendix A

Literature Review

GENDER EFFECTS IN PRESCHOOL CHILDREN'S CREATIVITY

Much has been written about creativity, as well as gender differences. However, few research studies have paired the two subjects, perhaps because of still unanswered questions. In this study, several topics will be discussed. Modeling, gender-typed behavior, parental behavioral variables, and cognition may play a relevant part in understanding whether gender differences do exist. If so, are these gender differences a result of inborn characteristics, or are they products of environment?

Maccoby and Jacklin's The Psychology of Sex Differences (1974) provides a starting place for examining environmental explanations of gender differences, such as modeling and socialization practices. According to Maccoby and Jacklin's synopsis of studies concerning the social processes that underlie gender differences, the role of imitation and identification are important in the acquisition of a child's gender-typed behavior (Kagan, 1964; Kohlberg, 1966; Mischel, 1970; Mussen, 1969; Sears, 1965). Studying different aspects of imitation and identification processes might be a key in understanding whether gender differences are biologically based or the result of social learning.

Maccoby and Jacklin remark that while observational learning definitely occurs, it is a question as to how children of both genders learn different things. They offer two explanations that are frequently cited: 1) the same-gender model is more available and 2) children choose same-gender models because of the similarities between themselves and the model. However, Maccoby and Jacklin thought that evidence supporting these assumptions was weak.

Several recent research studies also probe this area, and while some have reached the same conclusions as Maccoby and Jacklin, others have gone in a different direction. Perry and Bussey (1979) contend that the same-gender model hypothesis is more credible than what Maccoby and Jacklin concluded. Contrary to the idea that children imitate only one primary model, Perry and Bussey insist that children watch the behavior of many male and female models, and study the different behaviors that are performed in different situations. The results of Perry and Bussey's study confirmed their idea of multiple same-gender models. Another finding to surface from this study was that boys were more concerned than girls in matching their behavior with a model who performed gender-appropriate activities. The researchers suggested that boys have a strong desire to perform masculine actions and reject feminine actions. The researchers also pointed out that children have to be sure of their own gender, a function of cognition, before they can knowingly match the behavior of the same-gender model.

A study performed by Masters, Ford, Arend, Grotevant, and Clark, (1979) confirm the findings of Perry and Bussey and take it one step further. These researchers maintain that children imitate same-gender models and also use labels for gender-appropriate behavior. In their study, children were observed playing with gender-typed labeled toys. The researchers found that a gender-appropriate label put on a toy was a powerful determinant of whether a child would play with it.

The use of gender-appropriate labels seems only a step away from stereotyped labels. Albert and Porter (1983) examined the effects of the positive/negative quality of gender-role stereotypes on 4-, 5-, and 6-year-old children. In this study, children were given dolls in which they had to fix traditional, gender-role stereotypic labels onto them. The results showed that 4-year-old children were more likely to attribute the stereotypic labels to their own gender, regardless of the label. However, with the 5- and 6-year-old children, females tended to associate the stereotype of intellectual competence to males, while males attributed nurturant and helping behavior to females. The researchers suggested that preschool children want to maintain a positive image of their gender role due to positive gender-role stereotypes. But, by the time the child reaches 5 or 6 years of age, he or she is willing to differentiate the stereotypes between the genders.

Edelbrock and Sugawara (1978) have also studied the acquisition of gender-typed preferences in preschool children. Their study showed that when tested by an opposite-gender experimenter, both boys and girls adhered to gender-appropriate items, and avoided items that were gender-inappropriate. This finding could have a bearing on activities and behaviors of children at preschools and day-care centers, since the majority of caretakers are female. Edelbrock and Sugawara remarked that girls do have more exposure to same-gender models than boys. The researchers also found that boys were more stereotyped than girls. Since a boy's role model in the form of an adult male is relatively unavailable to him during the day in most cases, he will hold on to the most salient features of the masculine role.

White's study (1978) also confirms Edelbrock and Sugawara's finding that children perform gender-appropriate behaviors in front of a same-gender experimenter. White wanted to see if the source for the gender-appropriate label on the behavior influenced the children. He found that girls were not as affected by male-female manipulation of gender-appropriate labels of behavior as boys were. Again, this finding could tie in with Edelbrock and Sugawara's assumption that boys adhere to the more salient features of masculine behavior.

Raskin and Israel (1981) studied the effects of gender-role appropriate behavior with same-gender models in 8- and 9-year-old children. They found that boys imitated less when exposed to the inappropriate than to the appropriate behavior. However, in a second experiment, Raskin and Israel found no differences between boys and girls in either same or opposite-gender imitation. This study ties in with the previous studies cited, in that preschool and early school-age children are very aware of role model gender and behavior, and are trying to fit their gender stereotypes. However, as the children get older and mature cognitively, they are more apt to make their own judgments about behavior, and not be as concerned about stereotypes. At the very least, this reasoning may apply to girls, who can usually play with both dolls and toy cars, and not be criticized. Boys might be subject to ridicule for the same behavior, especially from their peers.

Lamb and Roopnarine (1979) studied peer influence on gender-role development in preschoolers. Their results suggested that from at least 3 years of age, peers reinforce each other for gender-appropriate activities. The results also showed that boys were more likely than girls to be positively reinforced by peers for male-typed behaviors, and girls were positively reinforced for female-typed behaviors more often than were boys. The researchers also found that boys, more often than girls, reinforced children of both genders for gender-appropriate behavior. The results suggested that peer reinforcement served to remind children of gender-stereotypical behavior of which they were also aware.

Just as peers can influence children towards appropriate gender-typed behavior, parents can also, consciously or unconsciously, steer children into certain behaviors. Wasserman and Lewis (1985) studied the ecological effects of gender differences. In their study, one-year-olds and their mothers were observed. The mothers were told that there would be a period of free play, in which they could interact as much as they wanted with their child. In the period of non-availability, mothers were not to initiate interaction with their child, but could respond briefly if the child initiated interaction. Wasserman and Lewis found that girls touched their mothers about three times as much as boys did during the non-availability period. However, there were no gender differences in the free play period. The authors noted that boys' touching remained at the same low level whether or not the mother was interacting. Results of this study also showed that girls remained nearer to their mothers than boys during maternal non-availability.

Another study examined gender differences in toddler's behavior, and again, parental reaction. Fagot (1974) observed toddlers in their own homes. She found that boys were significantly more likely to play on their own and not ask for help as often as girls. Boys also manipulated objects or toys more often than girls. In this same study, parents were asked to answer a questionnaire about their parenting behavior. According to the questionnaire, both parents gave girls more praise and criticism than boys.

Fagot (1978) replicated and extended her previous study. Again, parent and child interactions were observed, and a parental questionnaire was used. During the observation period, it was again noted that boys played more with blocks, manipulated objects more frequently, and played with transportation toys more often than girls. Girls played more with soft toys and asked for help more often than boys. In regard to the questionnaires, it was discovered that parents gave boys significantly more positive responses when they played with blocks than they did girls. Parents also gave girls more negative responses when they manipulated objects. Also, it was discovered that parents gave more positive responses to girls when they asked for help, and more negative responses to boys when they asked for help. According to Fagot's results, boys were praised for being independent thinkers and manipulators of objects, while girls were praised for being dependent on others.

However, two researchers discount Fagot's findings. Smith and Daglish (1977) also studied gender differences in parent and infant behavior in the home. They did not support Fagot's findings of boys playing more with blocks or manipulating small objects. They also did not find significant differences on parental interactions with sons and daughters. However, in the questionnaires administered, parents rated active play, play with transportation toys, aggressive behavior, and exploring behavior as typically masculine behaviors. The authors concluded from these results that stereotyped views of gender-typical behavior are clearly seen in many parents, and these views are partly grounded in actual behavioral differences between boys and girls. However, these authors contend that the parents probably tend to exaggerate these differences.

Lott (1978) concluded from her study that teachers can also exaggerate gender differences. In her study, kindergarten children were observed, and teachers and parents answered a questionnaire on gender-typing. There were few noticeable differences in the boys' and girls' observed behavior. According to the questionnaires, however, adults rated boys as being more rowdy, immature, and less docile than girls. Girls were rated as being more likely to cling to adults and ask for adult help.

Block (1983) gives a synopsis of the findings cited in the previously mentioned studies in her review. She reports that with respect to the socialization of sons, both parents in several independent samples pressed achievement and competition more on their sons than their daughters. Also, according to Block, both parents encouraged their sons, more than their daughters, to be independent and accept personal responsibility. Block found that boys' toys, more than girls' toys, afforded inventive possibilities, encouraged manipulation, and provided more explicit feedback from the physical world. Girls' toys were found to encourage imitation, were used more often in proximity to the caretaker, and provided less opportunity for variation and innovation. Block summarized that there appears to be appreciable gender-differentiated socialization at home and school, which allows boys greater freedom to explore and encourage curiosity, independence, and the testing of oneself in achievement and other competitive settings. Block also suggested that girls, more than boys, are socialized in ways encouraging the use of assimilative strategies for processing new information, while boys are socialized in ways that encourage the use of accommodative strategies when processing new information.

Tactual exploration of objects has been mentioned in several of the previously-cited studies. Adams and Bradbard (1984) studied this subject in greater detail. In their study, novel and familiar nursery school objects were given to the children with which to play. Results of the study showed that boys touched novel objects more than they did familiar objects, and girls touched familiar objects more than they did novel objects.

The use of gender-appropriate activities, same-gender models, and different socialization practices for the genders by both parents and teachers show how the environment can create gender differences. Many of the studies cited do not disregard inborn gender differences as being present. These studies do suggest that gender differences present at birth can be magnified by the child's environment throughout his or her early years. The connection between gender differences, inborn and magnified through socialization practices, and cognition and creativity might be an important one.

A study performed by Fu, Moran, Sawyers, and Milgram (1983) examines parental influence on creativity in preschool children. In this study, three parental attitudes were studied in relation to their preschooler's creativity. The attitudes were authoritarian-control, hostility-rejection, and democratic attitudes. According to the study, none of the parental variables was predictive of preschoolers creativity. The authors suggest, however, that parental child-rearing behaviors and not attitudes may be the determining factor in their children's creative abilities. If that suggestion is true, perhaps it could validate the studies previously cited. Specifically, parental behaviors could contribute to certain gender behaviors, which in turn could influence creative potential.

Development of Creativity Studies

Since research on creativity in young children has been relatively limited, there is a need to study different aspects of it. One such need that can be determined is in the area of gender differences and their relationship to creativity. Unfortunately, few research studies have focused on this particular area.

Wallach (1970) credits the work of J. P. Guilford and his associates as being some of the first creativity researchers. According to Wallach, the core of Guilford's analysis on creativity stems from distinguishing between convergent and divergent thinking. Guilford defines convergent thinking as the process of zeroing in upon an answer that is rather precisely implied or specified by the nature of the informational givens. Divergent thinking, according to Guilford, is the process of searching for material that is only loosely related to what is already known, so that one's search model is much more broad-gauged than in the former case. According to Guilford (1956), it is in divergent thinking that the most obvious indications of creativity are found. Guilford went further in defining creativity by isolating some subprocesses of divergent thinking, mainly ideational fluency. According to Guilford, ideational fluency refers to the ability to generate, within a limited time, ideas that will fulfill particular requirements, such as naming uses for bricks or naming problems that are suggested by certain common situations. To summarize, Guilford's divergent thinking factors are mainly concerned with fluency, flexibility, and novelty or uniqueness.

Many of Guilford's ideas of creativity have been accepted and put into use in creativity studies up to the present time. However, Wallach and Kogan (1965) have disagreed with the time limits that the Guilford group imposed upon its divergent thinking tasks. Wallach and Kogan emphasized freedom and spontaneity with divergent thinking, and saw no reason to impose time limits.

Since Guilford's time, other researchers have leaned heavily on his ideas and reshaped some of them into their own theories. According to Wallach (1970), Torrance has devoted his efforts to the furthering of creativity assessment procedures. The entire problem-solving sequence, from detecting a problem to communicating one's solution, is how Torrance views creativity in thinking processes. According to Wallach, Torrance's view of creativity is broader than Guilford's, since both divergent and convergent thinking plays a part in his theory. Torrance's assessment devices for creativity usually includes measures of fluency, flexibility, originality, and elaboration.

Mednick (1962) is another researcher whose approach to creativity has opened up new areas of thought. Mednick devised a response hierarchy, in which during a testing process, a person will give more mundane responses first, and then, more creative responses afterwards. The creative individual will be less fixated upon the common associations to an idea, according to Mednick, and be more capable of reaching the distant, inaccessible associations.

Wallach and Kogan (1965a, 1965b) approached creativity from a framework similar to that of Mednick. Wallach and Kogan's approach emphasized the importance of associative flow and the freedom to entertain wide-ranging associative possibilities in a playful manner. Some of Wallach and Kogan's assessment procedures are grounded in Guilford's methods, as in the instances and alternate uses tasks. The instances task asked the subject to generate possible instances of a class concept, such as round things. In the alternate uses procedure, the subject was to think of as many uses as possible for a verbally specified object, such as a chair or a shoe. Wallach and Kogan deviated from Guilford's methods, however, by not setting a time limit on the assessment tasks, and by emphasizing a playful or game-like atmosphere.

Researchers have continued to study creativity, and much of Guilford and Mednick's work continues to play a part in today's studies. However, according to Arasteh and Arasteh (1976), there has been little research done on creativity and the preschool child.

Starkweather (1964) was one of the pioneers in recognizing the need and importance of measuring creativity specifically in preschool children. In her research, she proposed that the component abilities identified in older children, such as fluency, flexibility, originality, and elaboration are not necessarily differentiated in early childhood. Starkweather maintained that the traditional methods of studying creativity in older children were not applicable to younger ones, and many researchers did not take this point into account when performing their studies. Also, Starkweather believed that the materials used in creativity studies with older children were inappropriate for preschoolers, because of the two-dimensional aspect of the materials. Young children needed to be able to handle the materials. To remedy this problem, Starkweather devised a measure of simple, three-dimensional objects cut into styrofoam shapes, which she used in her studies.

Ward (1968) and Busse, Blum, and Gutride (1972) also studied original thinking in young children. However, there were drawbacks in both of these studies. In the Ward study, the subjects were all considerably older on the average than children generally classified as preschoolers. Also, a time limit was imposed, and the subjects were not allowed to report all of their responses to the stimuli. In the Busse, et al. study, the subjects were all disadvantaged black children, and only one response was given to the stimuli presented. Finally, in both the Ward and Busse, et al. studies, the stimuli used were all two-dimensional, and the subjects were reinforced either verbally or with prizes. These reinforcements, of course, added another influence to the studies.

In more recent studies, the importance of using ideational fluency as a measure of creativity ability has been emphasized. Milgram and Arad (1981) studied a wide range of children, aged 7-13, who were divided into groups based on socioeconomic status and scores of a modified Wechsler Intelligence Scale for Children (Wechsler, 1974). Both stringent and lenient measures for original problem-solving were used with the subjects. Upon analysis, Milgram and Arad concluded that a strong relationship between lenient predictor measures and stringent criterion measures of original problem-solving was present in children across a wide range of age, intelligence level and socioeconomic status. Milgram and Arad further concluded that the findings provided strong support for the formulation of ideational fluency as a critical cognitive component of the creative processes in children.

Granting that ideational fluency measures are essential components in observing creative potential in preschoolers, other studies have examined the correct materials with which to tap this fluency. Starkweather, as previously cited, had concluded that two-dimensional materials were inappropriate for preschoolers, because no tactile exploration of the materials could take place. Moran, Milgram, Sawyers, and Fu (1983), using adaptations of the three-dimensional materials of Starkweather, compared the three-dimensional stimuli with two-dimensional stimuli. In their study, the tests were administered without time limits for responding and without reinforcements. Also, all of the responses given by the children were included in the analyses. These test conditions are quite a bit different than the conditions set in earlier studies, such as Guilford's or Mednick's.

The findings from the Moran, Milgram, Sawyers, and Fu (1983) study suggest that tasks consisting of three-dimensional stimuli were more appropriate measures of original thinking in preschool children than those consisting of two-dimensional stimuli. Also, the three-dimensional stimuli generated more responses than the two-dimensional stimuli. Another finding to surface from this study was that boys generated more original ideas than girls, so the possibility of gender differences relating to creativity was mentioned in one of the few times this issue was addressed with preschoolers.

New Directions

In view of the more current studies being performed concerning creativity and original problem-solving, Sawyers, Moran, and Tegano (1987) have devised a theoretical model of creative potential in young children. According to their model, creativity is defined as the interpersonal and intra-personal process by means of which original, high quality, and genuinely significant products are developed. These authors conceptualize that there is a developmental progression in creative behaviors. For young children, the criterion is originality; for older children, the component of quality is added; and for adults, the criterion also includes significance. The authors maintain that rather than ideational fluency serving as a predictor, it operates as a criterion measure for the potential for creative behavior in young children. This model also indicates that various factors may vary in influence as a function of age or context.

It is some of these factors that Sawyers, Moran, and Tegano believe could have a bearing on original problem-solving with which this study is concerned. In the model, cultural and biological factors, such as lifestyles and gender, can have a direct bearing on contextual factors, such as teacher and parent behavior. These factors could also have a bearing on personality variables, such as temperament and locus of control. Finally, cognitive processes, such as convergent and divergent thinking, make an impact on the ideational fluency present in a child.

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Appendix B

Description of Instruments

Description of Instruments

Ideational Fluency

The Multidimensional Stimulus Fluency Measure (Moran, et al., 1983) uses three tasks from the Wallach and Kogan model to index ideational fluency: Instances, Pattern Meanings, and Unusual Uses. For each task, the subject is first provided an example item, then asked to name all the things that they can think of to fit the particular task. (See pp. 40-45 for test instructions). The reliability and validity of the MSFM has been established as well as scoring protocols and normative data from research with over 120 preschool children (Godwin, 1984). Validity of the MSFM as a cognitive style distinct from intelligence was evidenced by Moran, Milgram, Sawyers, and Fu (1983) with correlation between original and popular scores with intelligence being .22 (NS). The MSFM appears to remain relatively stable, $r = .54$, $p<.01$ between the ages of four and seven (Moore & Sawyers, 1984). The intertask reliability for the MSFM tasks runs greatest between round and red, $r = .65$, $p<.05$, and lowest between boat and foot, $r = .24$. Scoring of the MSFM was accomplished by joint consensus of the three testers on the respond scores given in the scoring protocol (Godwin, 1984).

Creativity Research Group

General Instructions for the Examiner

Please bear in mind the following general guidelines:

(1) The establishment of the proper atmosphere for testing and rapport between examiners and subjects is a critical factor in this study. Examiner behavior can significantly affect the research results. Examiners must behave in a friendly manner, create a pleasant atmosphere, and refrain from any behavior which creates the impression of school-type testing and evaluation. The very words and actions of the examiner are critical.

(2) Examiners are requested to arrive early and to make a special effort by means of informal talk to establish rapport. It is imperative not to express anger or impatience at any time. It is important to maintain a pleasant tone in your speech at all times.

(3) Since testing procedures are not timed, each subject will finish at a different time. Allow children enough time to do this task. Do not overschedule.

(4a) The examiner must bear in mind the importance of establishing trust, a pleasant atmosphere, and the desire to participate. The warm-up game is designed to help achieve these goals. The examiner should maintain as natural a manner as possible while at the same time stimulate the child's interest in the games, and encourage him to think and to make the maximum effort to give as many responses as possible.

(4b) The examiner should exchange names with the subject, record the name, and continue to call the subject by his first name during the testing session. The child was asked his first name so that the examiner can use it in establishing a more relaxed and friendly atmosphere.

(4c) The examiner says:

> Today we are going to play some games. They are a new kind of game which you have probably not played before. We will play several different games. These are thinking and imagination games. You don't have to hurry. We can play for as long as you want.

(4d) Refer to specific task instructions for detailed instructions on tasks and answer sheets. Examiner records child's answers verbatim on the form provided.

If you do not have enough room, use the other side of the answer sheet.

(4e) At the end of the test session, the examiner should say to the subject, "That was the last game for today. Thank you for your cooperation, you were a big help. You did very well. I'll see you again and play some more games like these."

(5) The examiner is to answer the subject's questions in the following manner:

(a) Procedural questions are to be answered by repeating the instructions or explaining in synonymous terms.

(b) Questions designed to elicit help from the examiner are answered by saying, "Whatever you think" or "Do what you think is best."

(c) Children may ask, "Is that right?" Respond by saying: "There are no right or wrong answers, whatever you think is fine."

(6) It is important to remember that we are guests within the school and have been allowed the privilege of testing the children. We need to remain courteous at all times. Confidentiality of data must be respected. Also, children may refuse to be tested or decide to quit in the middle of the test session. If this occurs, use "gentle coercion" to try to persuade the child to stay, but if the child will not, discontinue testing for that day and try later in the week.

(7) Be sure to record any irregularities in testing, such as discontinuance, which might occur before, during, or after testing, on the form provided for general comments.

(8) In Session I, we will be using the following tasks:

1. Instances
2. Patterns

In Session II, the task will be:

1. Uses

Instances Task Instructions

"Now we're going to play a game called 'all the things you can think of'. I might say, 'Tell me things that hurt', and I would like you to tell me as many things as you can think of that hurt. Let's try it. Please tell me all the things you can think of that hurt." (Let the child try to generate responses.) Then reply with, "Yes, that's fine. Some other things that hurt are falling down, getting slapped, fire, getting bruised, a knife, and probably there are a lot of other things, too." (The examiner should vary answers so as to give all of these which the child did not give.) Then proceed by saying, "You see that there are all kinds of different answers in this game. Do you know how to play?" (If the child indicates understanding of the game, proceed with test items. If the child is still not understanding, terminate test sessions.) The examiner should then say, "Now, remember, I will name something and you are supposed to name as many things as you can. Take as long as you want. Okay, let's try another." (No help should be given to the child when test items are being used.)

(1) Name all the things you can think of that are ROUND.

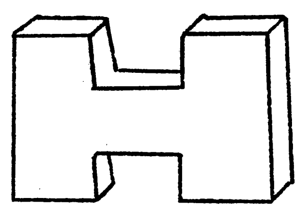
(2) Name all the things you can think of that are RED. When child stops responding, ask "What else can you think of?" or "Tell me some more things you can think of", until the child indicates he or she has no more responses.

Three-Dimensional Patterns Instructions

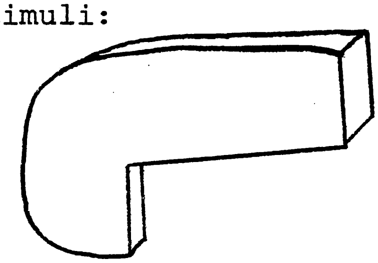
"In this game, I'm going to show you some blocks. After looking at each one, I want you to tell me all of the things you think each block could be. Here is an example- you can turn it any way you'd like to." (Give the example block to the child). "What could this be?" (Let the child respond). "Yes, those are fine. Some other things I was thinking of were a bridge, a bed, a building block, a chair, and there are probably a lot of other things, too." The examiner should vary answers as to give different ones than the child. If the child indicates an understanding of the game, proceed with the other two stimuli.

Drawings of Three-Dimensional Stimuli

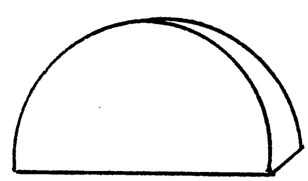
Example:



Stimuli:



"Hammer"



"Half"

Uses Task Instructions

"Now, today we have a game called 'What can you use it for?' 'The first thing we're going to play with will be a pencil.' (Examiner hands pencil to child). "I want you to tell me all the things you can think of that you can DO with a pencil, or PLAY with it, or MAKE with it. What can you use a pencil for?" (Let the child try to generate some responses). Then, reply with, "Yes, that's fine. Some other things you could use a pencil for are as a flagpole, to dig in the dirt, or you could use a pencil as a mast in a toy boat. Probably there are a lot of other things, too." (The examiner should vary answers, so as to give all of these which the child did not give.) Then proceed by saying, "You see that there are all different answers to this game. Do you know how to play?" If the child does not understand, repeat procedure from beginning. If child still does not understand, terminate. The examiner should then say, "Now, remember, I will name something and you are supposed to tell as many uses for it as you can think of. Take as long as you want. Let's try this one." No help should be given to the child on the test items.

(1) What can you use a BOX for?

(2) What can you use PAPER for?

Problems may arise when children ask additional questions. For example, if the child asks, "What size box?" the examiner should reply with a very neutral answer, such as "whatever size you think of." All clarifications of the test questions should be non-committal type. When the child stops responding, ask "What else can you think of?" or "Tell me some more things you can think of," until child indicates he or she has no more responses.

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Appendix C

Variable Code Labels

Variable Code Labels

V1	Subject number
V2	Gender (1 = male, 2 = female)
V3	Session 1 (1, 2, 3 = examiner 1, 2, 3)
V4	Session 2 (1, 2, 3 = examiner 1, 2, 3)
V5	Age in months
	MSFM SCORES: RAW DATA
V10	Total original
V11	Total popular
V12	Total fluency
V13	Original Red
V14	Popular Red
V15	Original Round
V16	Popular Round
V17	Original Half
V18	Popular Half
V19	Original Hammer
V20	Popular Hammer
V21	Original Paper
V22	Popular Paper
V23	Original Box
V24	Popular Box
	CODE LABELS FOR MEANS AND ANOVAS
V13	Original Red
V14	Popular Red
V15	Total Red
V16	Original Round

V17	Popular Round
V18	Total Round
V19	Original Responses Half
V20	Popular Responses Half
V21	Total Responses Half
V22	Original Responses Hammer
V23	Popular Responses Hammer
V24	Total Responses Hammer
V25	Original Responses Paper
V26	Popular Responses Paper
V39	Total Responses Paper
V40	Original Responses Box
V41	Popular Responses Box
V42	Total Responses Box
V43	Original Instances
V44	Popular Instances
V45	Original Patterns
V46	Popular Patterns
V47	Original Uses
V48	Popular Uses
V49	Total Instances
V50	Total Patterns
V51	Total Uses

Appendix D

Raw Data

Raw Data

V1	V2	V3	V4	V5	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
101	1	3	2	58	12	20	32	05	04	02	03	01	03	01	03
102	1	3	2	66	17	14	31	04	00	04	03	02	02	04	01
103	1	3	1	57	04	10	14	01	01	00	01	00	02	01	01
104	1	3	1	60	21	23	44	06	05	06	06	01	03	05	01
105	1	2	1	61	03	10	13	00	02	00	01	02	01	01	01
106	1	3	1	60	10	13	23	02	01	03	03	01	02	02	04
107	1	3	1	62	05	15	20	01	03	02	01	01	02	01	04
108	1	3	1	63	12	27	39	02	06	01	04	01	04	01	03
111	2	2	1	59	12	09	21	04	00	01	03	03	02	01	01
112	2	3	3	58	10	09	19	03	00	03	02	02	01	00	02
113	2	2	1	55	20	15	35	11	04	02	02	02	01	03	01
114	2	1	2	59	05	11	16	00	01	03	01	01	03	01	03
115	2	2	1	56	13	16	29	04	04	05	03	02	03	01	03
116	2	2	3	62	05	19	24	02	03	01	02	00	05	00	04
117	2	2	3	62	11	14	25	02	03	02	02	01	02	02	02

V1	V21	V22	V23	V24
101	02	03	01	04
102	01	02	02	06
103	02	03	00	01
104	03	03	00	05
105	00	02	00	03
106	00	02	02	01
107	00	02	00	03
108	07	04	00	06
111	00	02	01	01
112	01	03	01	01
113	02	02	00	05
114	00	01	00	02
115	00	03	01	00
116	00	03	02	02
117	01	02	03	03

V1	V2	V3	V4	V5	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
203	1	1	3	48	06	08	14	03	01	00	03	01	00	01	00
204	1	3	3	51	16	11	27	02	02	04	02	03	02	04	01
206	1	3	1	52	11	14	25	08	07	00	01	00	02	01	00
209	1	3	3	47	09	12	21	01	00	01	01	04	05	03	01
210	2	1	3	50	04	16	20	01	07	01	03	00	03	01	02
211	2	2	1	50	15	11	26	02	00	04	01	05	03	03	02
213	2	3	3	47	11	17	29	00	04	04	01	02	02	03	03
214	2	3	1	49	21	29	50	06	09	05	03	02	03	03	02
217	2	2	3	52	14	15	29	02	03	00	03	06	02	06	03

V1	V21	V22	V23	V24
203	00	02	01	02
204	01	03	02	01
206	00	01	02	03
209	00	03	00	02
210	01	01	00	00
211	01	02	00	03
213	01	03	01	05
214	01	11	04	01
217	00	03	00	01

V1	V2	V3	V4	V5	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
301	1	3	1	72	31	46	77	03	01	08	01	03	06	04	02
302	1	2	1	61	65	22	87	17	04	20	00	08	03	10	02
303	1	2	1	65	19	19	38	01	02	02	04	03	03	04	05
304	1	2	1	66	08	09	17	04	00	02	00	02	00	00	03
305	1	1	2	64	13	15	28	02	01	03	02	02	03	03	03
306	1	1	2	63	14	14	28	04	03	04	03	01	03	03	03
307	1	2	3	61	14	14	28	01	01	02	02	06	03	02	02
308	1	1	2	68	04	10	14	02	00	00	02	01	02	01	02
309	1	3	3	68	37	16	53	06	03	10	03	05	02	08	04
310	1	1	2	65	00	04	04	00	00	00	01	00	00	00	02
311	1	1	2	70	16	18	34	06	03	02	04	03	04	02	03
312	2	2	1	64	08	16	24	01	03	00	04	03	03	02	02
313	2	1	2	67	21	20	41	02	02	02	04	05	04	08	02
314	2	1	3	60	07	12	19	03	00	00	02	01	04	01	01
315	2	2	1	64	27	19	46	08	03	04	04	03	05	06	03

V1	V21	V22	V23	V24
301	09	19	04	17
302	05	08	05	05
303	04	04	05	01
304	00	01	00	05
305	01	02	02	04
306	01	01	02	01
307	01	03	02	03
308	00	02	00	02
309	05	01	03	03
310	00	01	00	00
311	02	02	01	02
312	01	02	01	02
313	02	06	02	02
314	01	02	01	03
315	03	01	03	03
316	01	04	00	04
317	01	03	00	02
318	00	03	00	03

V1	V2	V3	V4	V5	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
401	1	3	2	57	06	09	15	01	03	01	01	03	02	01	02
402	1	2	1	58	32	23	55	21	03	00	04	03	03	03	03
403	1	2	3	47	23	17	40	09	04	08	05	01	02	02	03
404	1	3	3	44	19	17	36	06	01	03	05	03	02	05	02
406	1	1	3	47	02	08	10	00	01	00	02	00	01	01	01
407	1	1	2	50	14	09	23	03	02	03	01	01	01	03	02
408	1	3	1	56	12	08	20	03	02	03	01	02	01	03	02
409	1	3	1	47	45	19	64	09	03	03	03	04	03	03	01
410	2	2	2	58	26	29	55	02	03	07	06	02	02	08	05
412	2	2	3	49	28	27	55	13	09	10	01	04	03	01	02
413	2	3	3	54	13	15	28	04	03	02	04	05	02	02	01
414	2	1	3	47	12	11	23	01	00	00	01	00	03	05	04
415	2	1	2	53	17	12	29	04	00	03	04	04	02	03	03
416	2	1	2	48	31	18	49	07	02	08	05	04	02	06	02
417	2	2	1	57	25	13	38	07	06	02	02	06	01	04	01
418	2	2	2	57	18	14	32	04	01	01	02	06	02	07	04

V1	V21	V22	V23	V24
401	00	01	00	00
402	02	05	03	05
403	02	00	01	03
404	01	02	01	05
406	01	01	00	02
407	02	03	02	00
408	00	01	01	01
409	21	04	05	05
410	06	02	01	10
412	00	08	00	04
413	00	03	00	02
414	03	01	03	02
415	00	01	03	02
416	02	04	04	03
417	02	03	04	00
418	00	03	00	02

Appendix E

Statistical Analyses

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V13 ORIGINAL RED

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.09677	4.75643	31
V2	FEMALE	4.22222	3.68295	27
FOR ENTIRE SAMPLE		4.15517	4.25421	58

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VARIABLE .. V16 ORIGINAL ROUND

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	3.06452	4.05738	31
V2	FEMALE	3.03704	2.59410	27
FOR ENTIRE SAMPLE		3.05172	3.42551	58

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V13 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	1273.68937	56	22.74445		
CONSTANT	1500.48305	1	1500.48305	65.97138	.000
V2	.06925	1	.06925	.00304	.956

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V16 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	426.52091	56	7.61644		
ITEM	35.47909	1	35.47909	4.65822	.035
V2 BY ITEM	.16875	1	.16875	.02216	.882

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V14 POPULAR RED

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.22581	1.80203	31
V2	FEMALE	2.81481	2.57259	27
FOR ENTIRE SAMPLE		2.50000	2.19449	58

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VARIABLE .. V17 POPULAR ROUND

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.19355	1.51480	31
V2	FEMALE	2.59259	1.36605	27
FOR ENTIRE SAMPLE		2.37931	1.44887	58

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V14 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	231.03345	56	4.12560		
CONSTANT	696.76827	1	696.76827	168.88906	.000
V2	7.04413	1	7.04413	1.70742	.197

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V17 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	155.81720	56	2.78245		
ITEM	.46728	1	.46728	.16794	.684
V2 BY ITEM	.26038	1	.26038	.09358	.761

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V15 TOTAL RED

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	6.32258	5.78727	31
V2	FEMALE	7.03704	5.26587	27
FOR ENTIRE SAMPLE		6.65517	5.51410	58

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VARIABLE .. V18 TOTAL ROUND

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	5.25806	4.34333	31
V2	FEMALE	5.62963	3.13967	27
FOR ENTIRE SAMPLE		5.43103	3.80264	58

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TESTS OF SIGNIFICANCE FOR V15 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	1912.77419	56	34.15668		
CONSTANT	4242.23443	1	4242.23443	124.19925	.000
V2	8.51029	1	8.51029	.24915	.620

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V18 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	635.19474	56	11.34276		
ITEM	44.08974	1	44.08974	3.88704	.054
V2 BY ITEM	.84836	1	.84836	.07479	.785

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V25 ORIGINAL RESPONSES PAPER

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.32258	4.11815	31
V2	FEMALE	1.11111	1.33973	27
FOR ENTIRE SAMPLE		1.75862	3.18059	58

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VARIABLE .. V40 ORIGINAL RESPONSES BOX

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	1.41935	1.62838	31
V2	FEMALE	1.29630	1.43620	27
FOR ENTIRE SAMPLE		1.36207	1.52980	58

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V25 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	481.22700	56	8.59334		
CONSTANT	272.85059	1	272.85059	31.75140	.000
V2	12.85059	1	12.85059	1.49541	.226

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V40 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	207.39188	56	3.70343		
ITEM	3.72019	1	3.72019	1.00453	.321
V2 BY ITEM	8.54778	1	8.54778	2.30807	.134

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V26 POPULAR RESPONSES PAPER

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.93548	3.35594	31
V2	FEMALE	3.03704	2.20979	27
FOR ENTIRE SAMPLE		2.98276	2.85615	58

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VARIABLE .. V41 POPULAR RESPONSES BOX

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	3.25806	3.06559	31
V2	FEMALE	2.51852	2.00711	27
FOR ENTIRE SAMPLE		2.91379	2.63102	58

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V26 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	679.75269	56	12.13844		
CONSTANT	996.04042	1	996.04042	82.05670	.000
V2	2.93697	1	2.93697	.24196	.625

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V41 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	171.75747	56	3.06710		
ITEM	.27702	1	.27702	.09032	.765
V2 BY ITEM	5.10460	1	5.10460	1.66431	.202

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V42 TOTAL RESPONSES BOX

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.67742	3.95295	31
V2	FEMALE	3.81481	2.27084	27
FOR ENTIRE SAMPLE		4.27586	3.28096	58

- -

VARIABLE .. V39 TOTAL RESPONSES PAPER

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	5.25806	6.37164	31
V2	FEMALE	4.14815	2.42905	27
FOR ENTIRE SAMPLE		4.74138	4.93665	58

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V39 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	280.77419	56	5.01382		
ITEM	6.02753	1	6.02753	1.20218	.278
V2 BY ITEM	.44132	1	.44132	.08802	.768

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V42 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	1693.41697	56	30.23959		
CONSTANT	2311.52269	1	2311.52269	76.44028	.000
V2	28.07441	1	28.07441	.92840	.339

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V19 ORIGINAL RESPONSES HALF

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.12903	1.83924	31
V2	FEMALE	3.03704	2.19232	27
FOR ENTIRE SAMPLE		2.55172	2.04487	58

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VARIABLE .. V22 ORIGINAL RESPONSES HAMMER

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.54839	2.17315	31
V2	FEMALE	2.96296	2.45704	27
FOR ENTIRE SAMPLE		2.74138	2.29844	58

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V19 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	394.38710	56	7.04263		
CONSTANT	822.62152	1	822.62152	116.80607	.000
V2	12.62152	1	12.62152	1.79216	.186

* A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V22 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	130.70012	56	2.33393		
ITEM	.86023	1	.86023	.36857	.546
V2 BY ITEM	1.75678	1	1.75678	.75271	.389

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V20 POPULAR RESPONSES HALF

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.29032	1.37097	31
V2	FEMALE	2.62963	1.11452	27
FOR ENTIRE SAMPLE		2.44828	1.25897	58

- -

VARIABLE .. V23 POPULAR RESPONSES HAMMER

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	2.16129	1.21372	31
V2	FEMALE	2.62963	1.27545	27
FOR ENTIRE SAMPLE		2.37931	1.25415	58

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TESTS OF SIGNIFICANCE FOR V20 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	105.43130	56	1.88270		
CONSTANT	680.43077	1	680.43077	361.41186	.000
V2	4.70663	1	4.70663	2.49993	.119

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TESTS OF SIGNIFICANCE FOR V23 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	69.74194	56	1.24539		
ITEM	.12013	1	.12013	.09646	.757
V2 BY ITEM	.12013	1	.12013	.09646	.757

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V21 TOTAL RESPONSES HALF

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.41935	2.69288	31
V2	FEMALE	5.66667	2.41788	27
FOR ENTIRE SAMPLE		5.00000	2.62244	58

- -

VARIABLE .. V24 TOTAL RESPONSES HAMMER

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.70968	2.62289	31
V2	FEMALE	5.59259	3.05412	27
FOR ENTIRE SAMPLE		5.12069	2.84128	58

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V21 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	600.33453	56	10.72026		
CONSTANT	2999.36375	1	2999.36375	279.78462	.000
V2	32.74306	1	32.74306	3.05432	.086

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V24 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	218.11947	56	3.89499		
ITEM	.33742	1	.33742	.08663	.770
V2 BY ITEM	.95811	1	.95811	.24599	.622

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V43 ORIGINAL INSTANCES

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	7.16129	7.59867	31
V2	FEMALE	7.25926	5.59940	27
FOR ENTIRE SAMPLE		7.20690	6.68530	58

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VARIABLE .. V45 ORIGINAL PATTERNS

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.67742	3.70933	31
V2	FEMALE	6.00000	3.80283	27
FOR ENTIRE SAMPLE		5.29310	3.77902	58

- -

VARIABLE .. V47 ORIGINAL USES

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	3.74194	5.25971	31
V2	FEMALE	2.40741	2.25762	27
FOR ENTIRE SAMPLE		3.12069	4.16366	58

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V43 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	2563.18280	56	45.77112		
CONSTANT	4696.79422	1	4696.79422	102.61479	.000
V2	.03560	1	.03560	.00078	.978

* A N A L Y S I S   O F   V A R I A N C E * * * * * * *

EFFECT .. TASK

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 1, M = 0, N = 26 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.32198	13.05902	2.00	55.00	.000
HOTELLINGS	.47487	13.05902	2.00	55.00	.000
WILKS	.67802	13.05902	2.00	55.00	.000
ROYS	.32198				

* A N A L Y S I S   O F   V A R I A N C E * * * * * * *

EFFECT .. V2 BY TASK

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 1, M = 0, N = 26 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.09042	2.73369	2.00	55.00	.074
HOTELLINGS	.09941	2.73369	2.00	55.00	.074
WILKS	.90958	2.73369	2.00	55.00	.074
ROYS	.09042				

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V44 POPULAR INSTANCES

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.41935	2.76615	31
V2	FEMALE	5.40741	2.99049	27
FOR ENTIRE SAMPLE		4.87931	2.89026	58

- -

VARIABLE .. V46 POPULAR PATTERNS

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	4.45161	1.98055	31
V2	FEMALE	5.25926	1.89316	27
FOR ENTIRE SAMPLE		4.82759	1.96583	58

- -

VARIABLE .. V48 POPULAR USES

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	6.19355	6.16668	31
V2	FEMALE	5.55556	2.90004	27
FOR ENTIRE SAMPLE		5.89655	4.89428	58

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V44 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	891.51254	56	15.91987		
CONSTANT	4708.65412	1	4708.65412	295.77220	.000
V2	6.44723	1	6.44723	.40498	.527

* A N A L Y S I S   O F   V A R I A N C E * * * * * * *

EFFECT .. TASK

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 1, M = 0, N = 26 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.04671	1.34760	2.00	55.00	.268
HOTELLINGS	.04900	1.34760	2.00	55.00	.268
WILKS	.95329	1.34760	2.00	55.00	.268
ROYS	.04671				

* A N A L Y S I S   O F   V A R I A N C E * * * * * * *

EFFECT .. V2 BY TASK

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 1, M = 0, N = 26 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.02588	.73061	2.00	55.00	.486
HOTELLINGS	.02657	.73061	2.00	55.00	.486
WILKS	.97412	.73061	2.00	55.00	.486
ROYS	.02588				

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE .. V49 TOTAL INSTANCES

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	11.58065	8.95833	31
V2	FEMALE	12.66667	7.38502	27
FOR ENTIRE SAMPLE		12.08621	8.21057	58

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VARIABLE .. V50 TOTAL PATTERNS

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	9.12903	4.79404	31
V2	FEMALE	11.25926	4.43407	27
FOR ENTIRE SAMPLE		10.12069	4.71309	58

- -

VARIABLE .. V51 TOTAL USES

FACTOR	CODE	MEAN	STD. DEV.	N
V2	MALE	9.93548	9.93625	31
V2	FEMALE	7.96296	4.04286	27
FOR ENTIRE SAMPLE		9.01724	7.77195	58

* A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * * * * * * *

TESTS OF SIGNIFICANCE FOR V49 USING UNIQUE SUMS OF SQUARES

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG. OF F
WITHIN CELLS	5168.58781	56	92.29621		
CONSTANT	18810.88920	1	18810.88920	203.80998	.000
V2	7.44092	1	7.44092	.08062	.778

* A N A L Y S I S   O F   V A R I A N C E * * * * * * *

EFFECT .. TASK

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 1, M = 0, N = 26 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.12625	3.97365	2.00	55.00	.024
HOTELLINGS	.14450	3.97365	2.00	55.00	.024
WILKS	.87375	3.97365	2.00	55.00	.024
ROYS	.12625				

* A N A L Y S I S   O F   V A R I A N C E * * * * * * *

EFFECT .. V2 BY TASK

MULTIVARIATE TESTS OF SIGNIFICANCE (S = 1, M = 0, N = 26 1/2)

TEST NAME	VALUE	APPROX. F	HYPOTH. DF	ERROR DF	SIG. OF F
PILLAIS	.08228	2.46553	2.00	55.00	.094
HOTELLINGS	.08966	2.46553	2.00	55.00	.094
WILKS	.91772	2.46553	2.00	55.00	.094
ROYS	.08228				

Appendix F

Letter to Parents

Oklahoma State University

DEPARTMENT OF FAMILY RELATIONS
AND CHILD DEVELOPMENT

STILLWATER, OKLAHOMA 74078
241 HOME ECONOMICS WEST
(405) 624-5057

February 24, 1986

Dear Parent,

We are preparing a research project on creativity sponsored by the Department of Family Relations and Child Development at OSU. This project will help us understand the development of creative thought. We would like to have your cooperation in permitting your child to participate in the project. Your child will be asked to respond to several standardized questions in a "pressure-free" setting. Since we are interested in the child's thought processes, there are no right, wrong or expected answers to the questions.

Each child will be seen individually by a researcher for a 15-minute session. In these sessions, measures of creativity and other cognitive tasks will be administered. Our experience has been that most children very much enjoy participating in research of this kind (the activities are similar to those already in the child's classroom or home). Your child's name will not be attached to the answer forms to ensure confidentiality.

We respect the right of the parent and of the child to withdraw from the research project at any time. No child will be forced to participate if he or she does not want to. As previously mentioned, however, we do not foresee any physical, emotional, or social risks to you or the child which might result from participation. We will be more than happy to share our results with you upon completion of the research.

We are assuming that, after you have read this information, we have your consent and can use your child in our research project. If you do not want your child to participate, or have any questions about the research, please contact the researchers through the Department of Family Relations and Child Development (624-5057). Thank you for your cooperation.

Respectfully,

Jim Moran

Dr. Jim Moran, Project Director

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CENTENNIAL
DECADE
1980 • 1990

VITA

Shari Ann Haynie

Candidate for the Degree of

Master of Science

Thesis: GENDER EFFECTS IN PRESCHOOL CHILDREN'S CREATIVITY

Major Field: Family Relations and Child Development

Biographical:

Personal Data: Born in Altus, Oklahoma, August 29, 1963, the daughter of Ronald and Sue Haynie. Married to Joe Freeland on May 31, 1986.

Education: Graduated from Tipton High School, Tipton, Oklahoma, in May, 1981; received Bachelor of Science Degree in Family Relations and Child Development from Oklahoma State University in May, 1985; completed requirements for the Master of Science Degree at Oklahoma State University in May, 1987.

Professional Experience: Graduate Research Assistant, Oklahoma State University, August, 1985, to March, 1986; Member Omicron Nu Honorary Society; Member Phi Upsilon Omicron Honorary Society; Member Phi Kappa Phi Honorary Society.

Publications: Moran, J. D. III, Bomba, A. K., Broberg, G. C., & Freeland, S. Haynie. (1987). Personality correlates of creative potential in preschool children. Proceedings of the 52nd Biennial Meeting of the Society for Research in Child Development.