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THE RELATIONSHIP BETWEEN CREATIVITY AND  
THE ABILITY TO DO CERTAIN SELECTED  
PIAGETIAN CLASSIFICATION TASKS  
IN KINDERGARTEN CHILDREN

by

PATRICIA ANN MEYER

Submitted to the Faculty of the Graduate School of  
East Texas State University  
in partial fulfillment of the requirements  
for the degree of  
DOCTOR OF EDUCATION  
August, 1976

THE RELATIONSHIP BETWEEN CREATIVITY AND  
THE ABILITY TO DO CERTAIN SELECTED  
PIAGETIAN CLASSIFICATION TASKS  
IN KINDERGARTEN CHILDREN

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## ABSTRACT

### THE RELATIONSHIP BETWEEN CREATIVITY AND THE ABILITY TO DO CERTAIN SELECTED PIAGETIAN CLASSIFICATION TASKS IN KINDERGARTEN CHILDREN

Patricia Ann Meyer, Ed.D.  
East Texas State University, 1976

Advisor: A. D. Castle

Purpose of the Study: This study was designed to determine the relationship between creativity and the ability to do certain Piagetian classification tasks in kindergarten children.

Procedure: Fifty kindergarten children (twenty-five males and twenty-five females) from the kindergarten population at Stephenson School, Bonham, Texas, were selected as subjects for this study. The children were administered the Starkweather Originality Test for Young Children and certain Piagetian classification tasks.

The Starkweather Originality Test for Young Children was used to measure the creativity of the children, and the Piagetian classification tasks were used to determine the classification abilities of the children. Point-biserial correlations were computed to

determine any significant relationships between creativity and the ability to classify according to color, shape and size. Point-biserial correlations were also computed to determine any significant relationships between creativity and the ability to perform true classification, multiplicative classification and class inclusion. Tests for analysis of variance were developed to determine significant differences exhibited by male and female subjects between the scores on the Starkweather Originality Test for Young Children and the Piagetian classification tasks. A point-biserial correlation was computed to determine any significant relationship between the sex of the subjects and their scores on the creativity test. The .05 level of significance was chosen for the level of rejection of null hypotheses.

Findings: 1. There was no significant relationship between creativity and the ability to classify according to color, shape or size, and to do true classification, multiplicative classification and class inclusion.

2. There were no significant differences exhibited by male and female subjects in the relationship between the scores on the Starkweather Originality Test for Young Children and the Piagetian classification tasks.

3. There was no significant relationship between the sex of the subjects and their scores on the creativity test.

Conclusions: 1. Creativity is not a determining variable in the development of the ability to classify, and classification abilities are not important to the development of creativity in kindergarten children.

2. Kindergarten males and females exhibit no differences in their relationship between creativity and the ability to classify.

3. The sex of the kindergarten child is not a determining variable in the development of creativity.

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## Chapter 1

### INTRODUCTION

Sputnik hurtled into the heavens and early childhood education came of age. The launching of Sputnik by the Russians in 1957 sent shockwaves throughout America as this phenomenon was viewed as a symbol of the superiority of the Russian educational system (Morrison, 1976:3). Criticism of American education was already in an advanced stage at this time. Critics warned that the education of American children was sadly lacking and schools in America were described as being inferior to those of other nations. The American educational system was attacked for not adequately preparing children for the scientific age.

The attack on the American schools began in the early 1950's when critics such as Robert Hutchins and Admiral Hyman Rickover berated the schools for neglecting the development of skills and specifically the three R's (Elkind, 1973b:109). Many articles appeared detailing the fact that Johnny and Mary could not read. Flesch (1955:10), in the book entitled, Why Johnny Can't Read, led the attack on the schools with a criticism of the way schools taught reading. Many parents who were dissatisfied with their children's poor test scores and inability to read and compute

demanded schools which would teach these skills. Preschools did not escape this controversy as critics indicated that many programs were merely a period of marking time for children. The socialization of the traditional preschool curriculum was viewed as inadequately preparing the child for college entrance and the job market (Morrison, 1976:3).

In the 1960's criticism and scrutiny of the public schools evolved from the Civil Rights Movement and the War on Poverty (Elkind, 1973b:110). As disadvantaged children were labeled and discussed in the media, schools defended themselves with the argument that these disadvantaged children were unprepared for the white middle class first grades (Elkind, 1973b:110). Hunt (1968:195), a strong advocate of early schooling, stated that early intervention in the development of children can be an antidote to the ravages of poverty.

Educators reacted to this situation by exploring new teaching methods, developing many new materials, and revising curricula. After years of disinterest in preschool education, the limelight was focused on the young child in an attempt to determine how children learn. Many educators began to wonder if they were delaying school entry too long for American children. An examination of the Soviet educational system revealed that the children in Russia enter school



at an earlier age than is customary in the United States (Morrison, 1976:3).

The work of Benjamin Bloom supported the view that early education is necessary since children's ability to learn is influenced by early experience (Hess and Croft, 1972:12). Neither Bloom nor Hunt believed in fixed intelligence or automatic maturation. Bloom stated that if the acquisition of a child's intelligence is established by the age of seventeen then 50 percent of a child's intelligence is acquired by the age of four (Bloom, 1964:68). This proposal of Bloom's that the intellectual growth of children is more rapid in the early years contradicted the traditional concept of maturation and readiness. Many of today's educators believe that intelligence results from interaction between the child's genetic endowment and the environment rather than native endowment alone.

Contemporary educators discovered what theorists had sensed centuries before. John Amos Comenius recognized the importance of educating the very young, and his educational system began the Mother School in 1657. This was a forerunner of the present-day nursery school (Meyer, 1965:244). Robert Owen, a successful Scottish millowner, established the first infant school in Great Britain in the early 1800's (Good, 1960:270). Owen was convinced that in order for education to be effective it had to begin when the child was very young (Auleta, 1969:19). In 1742 the publishing of

Rousseau's Emile emphasized the importance of early education. Rousseau (1892:9-40) wrote that education should begin at birth and end at age twenty-five.

In 1837, a German, Frederich Froebel, established the kindergarten, a school in which children could grow and develop naturally (Meyer, 1965:368). Froebel (1889:68) believed that children unfolded from within.

. . . all the child is ever to be and becomes, lies-- however slightly indicated--in the child, and can be attained only through development from within outward.

The Froebelian kindergarten was introduced in the United States in the middle 1800's by German refugees. American educators adopted it and then changed it to meet the needs of American children (Meyer, 1965:372).

As the kindergarten grew and developed in America in the late 1800's and early 1900's it became associated with Progressive education and scientific thinking (Weber, 1969:47). One Progressive Education leader, G. Stanley Hall, President of Clark University, was greatly influenced by Darwin's The Origin of Species (Weber, 1969:48). This unprecedented method of investigation struck Hall as suitable for use in studying young children. Armed with questionnaires and surveys, Hall gathered data and identified the needs and characteristics of young children. Weber (1969:49) stated that, from the collection of data, Hall developed the thesis that "Otogeny, or

individual development, recapitulates phylogeny, the development of the race." This idea evolved from the old Recapitulation theory that each child progresses through the same stages in the physical, mental, intellectual and social development as has civilization (Hall, 1907:288-89). Hall became an ardent evolutionist and imparted ideas on fixed intelligence to generation after generation of college students (Hunt, 1961:43).

Hall believed that children of four or five years of age were in the myth-making stage similar to that of a savage (Weber, 1969:86). In order to recapitulate the fantasy of the myth-making stage, Hall decided that kindergarten children needed plenty of freedom of movement and expression. Hall reasoned that intellectual development was a much later stage which occurred in an older child (Weber, 1969:49). As a result of Hall's research, emphasis was placed upon the development of freedom of expression or creativity of kindergarten children (Good, 1960:286). The kindergarten during the Progressive era was one in which free play, freedom of movement, freedom of expression and socialization were of utmost importance (Butts, 1955:492).

Emphasis upon freedom of expression and free play during the Progressive era led to many studies on creativity in the 1940's and 1950's. These studies helped to identify the factors which determine creativity. Torrance (1962:5) stated that children who were

labeled as creative enjoyed exploring and manipulating the environment. In a study concerning five-year-old children, Torrance (1963:178) found that the degree of manipulation of toys by the children was related significantly to the quantity and quality of creative responses. Torrance (1962:5) concluded that interaction with the environment was a very important factor in learning creatively. He stated that creative children "enjoy learning and thinking, and this looks like play rather than work."

Another basic concept to evolve from Hall's research on children was that of readiness. Arnold Gesell, a student of Hall's, was a physician who observed children for forty years. In his observations Gesell tried to detect the developmental stages through which children pass and almost as important, the age at which the child passes from one growth stage to another. Gesell identified readiness as resulting from the natural maturation or development of the child and was influenced by environmental factors (Durkin, 1966:21). Maturation and learning were viewed as two separate processes with maturation predetermined by heredity. The environment was considered to be of no consequence in the child's development (Hunt, 1968:184-85).

Contemporary educators indicate that the belief in fixed intelligence, so prominent during the first half of the twentieth century, was misplaced (Hunt, 1972:34). Hunt observed that since

World War II evidence has been accumulated that repudiated the idea of fixed intelligence. Dennis (1960:58) concluded from his research on institutionalized children that when the environment was restrictive and unresponsive, it resulted in lower intelligence and poor locomotor development in the children. Hunt (1961), in the book Intelligence and Experience, concluded that all evidence once believed to support the theory of fixed intelligence could be restructured to uphold the importance of the environment in the intellectual development of the child. In the 1970's intelligence is viewed as a result of interaction between the child's heredity and experience as a result of the environment (Lavatelli, 1970:5). This is consistent with the views of Jean Piaget, a Swiss genetic epistemologist who began a study of children at a time when heredity was thought to be the only factor determining intelligence (Honstead, 1968:133).

Early childhood education has been profoundly influenced in the past decade by the work of Jean Piaget (Lavatelli, 1970:1). Piaget's study of children and their cognitive development has enabled teachers to view children in a new perspective. This work began in Alfred Binet's laboratory in Paris, France, on the standardization of intelligence test items (Wadsworth, 1971:3). Piaget became interested in the incorrect answers of children as well as the correct ones, and this led to the extensive investigation of children's intellectual abilities (Flavell, 1963:3).

Piaget published studies on the spontaneous behavior of his own children. Lavatelli stated that Piaget devised a series of developmental tasks in number, space, seriation, conservation and classification, and recorded children's reasoning and responses to the tasks (Lavatelli, 1970:44). From these careful recordings and observations, Piaget gave support to the theory of cognitive development. About Piaget's theory of equilibration, Weber (1969:216) stated:

. . . For Piaget intellectual growth is a developmental process involving two interactive functions between the individual and his environment: (1) inward integration or organization, called assimilation, and an (2) outward adaptive coping, called accommodation. Further development depends on these internal and external factors "equilibrating" each other through the self regulation and self correction of the person. Equilibration represents the point at which the processes of accommodation and assimilation achieve a fruitful balance.

Piaget pictured the development of intelligence as periods or stages of cognitive reorganization. These periods are: the sensorimotor period, which begins at birth and continues until the age of two; the preoperational period, from approximately the age of two until the age of seven; the period of concrete operations, roughly from seven until eleven years of age; and the final period, that of formal operations where abstract thought develops approximately between the age of eleven or twelve (Kamii and Radin, 1967:315).

According to Piaget's theory, kindergarten children are in the preoperational period of development (Baldwin, 1967:245).

Their language has developed at a rapid rate and has become inter-related with their thoughts. Piaget's developmental tasks are used during this stage to assess children's cognitive abilities (Almy, Chittenden and Miller, 1966:50-51). A pre-school curriculum created around Piaget's ideas would include activities of simple sorting, classification, seriation, order and conservation (Lavatelli, 1970:44).

Piaget's research has encouraged preschool educators who were concerned with the lack of emphasis on the intellectual development of children in the traditional kindergarten (Almy, Chittenden and Miller, 1966:136). The issue facing preschool educators now is to identify and develop the curriculum which will prepare kindergarten children for life in the "technocratic society" of the future (Toffler, 1970:464). Toffler (1970:402), in the book Future Shock, predicted the world of tomorrow and the individuals who will survive and prosper in it.

. . . The technology of tomorrow requires not millions of lightly lettered men, ready to work in unison at endlessly repetitious jobs, it requires not men who take orders in unblinking fashion, aware that the price of bread is mechanical submission to authority, but men who can make critical judgments, who can weave their way through novel environments, who are quick to spot new relationships in the rapidly changing reality.

Torrance (1962:6) believed that the survival of civilization depends upon the creativity of the next generation. He stated:

. . . It takes little imagination to recognize that the future of our civilization--our very survival--depends upon the quality of the creative imagination of our next generation. . . .

Democracies collapse only when they fail to use intelligent

imaginative methods for solving their problems. Greece failed to heed such a warning by Socrates and gradually collapsed.

Hunt (1961:363) stated that the future depends upon the intelligence of the next generation.

. . . Nevertheless, ours is a technological culture of increasing complexity. Its development continually demands an ever larger proportion of the population with intellectual capacity at the higher levels. It calls also for intellectual giants to solve the problems that become increasingly complex. The fact that it is reasonable to hope to find ways of raising the level of intellectual capacity in a majority of the population makes it a challenge to do the necessary research. It is one of the major challenges of our time.

Educators who favor the traditional kindergarten curriculum which places emphasis upon creativity believe that the child's needs to grow, play and create are important for the ability to cope with the future and meet and deal with new problems in new ways. On the opposite side of the issue are those who favor a program which emphasizes cognitive growth. They favor instruction in Piaget's developmental tasks and fear that the abilities of children are being underestimated and unchallenged.

#### STATEMENT OF THE PROBLEM

Kindergarten programs have been developed around characteristics which were thought to be variant. This study was designed to determine the inter-relatedness of some of these characteristics. Specifically, the study attempted to determine if there is a



relationship between creativity and the cognitive abilities of kindergarten children. The study also assessed the differences exhibited by male and female children in these same areas.

### SIGNIFICANCE OF THE STUDY

The significance of this study is that it would contribute to knowledge about the development and abilities of kindergarten children. In all early childhood programs, concern should be with the whole child and not just the cognitive domain or creative abilities.

Senn (1969:12) stated:

. . . The "whole child" represents a composite organism, the physical, emotional and social self that learns through a variety of processes, cognitive learning being only one important component . . . .

The existence of a significant relationship between creativity and cognitive abilities of kindergarten children would indicate the need for developing kindergarten programs which incorporate both these areas. Discovery of significant differences exhibited by male and female kindergarten children between creative and cognitive abilities would contribute to the area of child study. The cognitive abilities tested in this study are classification abilities.

## PURPOSE OF THE STUDY

Issues facing preschool educators today are conflicting and perplexing. Early childhood educators disagree about the types of curricula which would best meet the educational needs of children and prepare them for the problems of the future. Traditional kindergarten curriculum is based upon developing the self-expression or creativity of children. Educators who favor a more cognitively oriented curriculum are concerned that delaying instruction will hamper children and delay intellectual growth.

Interaction with the environment is viewed as important in the development of creativity (Torrance, 1962:16) and cognitive abilities (Piaget, 1952:357). Since creativity and cognition are involved with the child's interaction with the environment, it was anticipated that there must be a relationship between these two areas. Hendrick (1975:217) stated, "In addition, cognition is so intertwined with creativity that it is obvious that these topics should be discussed together."

The purpose of this study is to determine if there is a specific relationship between kindergarten children's creativity and ability to perform certain Piagetian classification tasks. An assumption was made that creativity and classification skills both develop in the very young child so there must be a relationship between the two capabilities.

The study also was developed to assess the differences exhibited by male and female kindergarten children between creativity and the ability to do certain Piagetian classification tasks. Finally, the study attempted to detect any significant relationship between the sex of the kindergarten child and his creativity score. Any significant relationships discovered would contribute information to the area of child study.

The creativity factor studied was originality or freedom of expression. Certain Piagetian classification tasks were administered to ascertain classification skills.

#### STATEMENT OF THE HYPOTHESES

This study rejects or fails to reject the following null hypotheses at the .05 level of significance.

1. There is no statistically significant relationship between the creativity of kindergarten children and their ability to classify according to color.
2. There is no statistically significant relationship between the creativity of kindergarten children and their ability to classify according to shape.
3. There is no statistically significant relationship between the creativity of kindergarten children and their ability to classify according to size.

4. There is no statistically significant relationship between the creativity of kindergarten children and their ability to do true classification.

5. There is no statistically significant relationship between the creativity of kindergarten children and their ability to do multiplicative classification.

6. There is no statistically significant relationship between the creativity of kindergarten children and their ability to do class inclusion.

7. There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to color.

8. There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to shape.

9. There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to size.

10. There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to do true classification.

11. There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the

ability to do multiplicative classification.

12. There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to do class inclusion.

13. There is no statistically significant relationship between the sex of the kindergarten children and their creativity score.

### DELIMITATIONS OF THE STUDY

This study was limited to children in the Early Childhood Program at Stevenson School, Bonham, Texas. All children participating in the study were between the ages of five years, zero months and six years, two months.

The scope of this study was limited as to the number of children and the regions of the country investigated. Therefore, the conclusions of this study are applicable only to kindergarten children in Bonham, Texas.

### DEFINITION OF TERMS

The definitions important to this study are the following:

Accommodation: The internal process of changing ideas to fit the new information (Honstead, 1968:135).

Adaptation: The simultaneous assimilation-accommodation process.

Assimilation: The taking in of information through the senses and incorporating the information into the cognitive structure (Morrison, 1976:62).

Classification: The identification and matching of objects according to their properties or purpose.

Class Inclusion: The ability to recognize a small class of objects within a larger class.

Cognition: The process whereby an organism becomes aware or obtains knowledge of an object, a quality or an idea (Getzels and Jackson, 1962:13).

Cognitive Abilities: The abilities possessed by children through which knowledge is acquired and maintained.

Concrete Operations: Thought processes which are logical and systematic and are tied to direct experiences.

Creativity: Freedom of expression.

Equilibration: A process which balances those things a child previously understood and those yet to be understood (Honstead, 1968:135).

Formal Operations: Thought processes which are systematic, logical and not tied to direct experiences.

Kindergarten: The organized educational program for children who are usually five to six years of age.

Kindergarten Children: Children who are enrolled in the

kindergarten program.

Maturation: The natural ripening and growth of an individual.

Multiplicative Classification: Classification by more than one property at a time.

Preoperational: Thought processes which are not reversible.

Preschool: Any educational program developed for children prior to first grade.

Readiness: The terms used to describe the state of being ready to acquire a skill.

Sensorimotor: Thought processes which result as the child utilizes sensory input and motoric reflexes.

Structure: A mental system developed through the processes of assimilation and accommodation.

True Classification: Abstraction of the common property in a group of objects.

## DESIGN OF THE STUDY

The subjects of this study were the total population of the classrooms at Stephenson School, Bonham, Texas. All the children were five years of age before September 1, 1975, which is the required age for enrollment in a public school kindergarten in the State of Texas. The Starkweather Originality Test for Young Children and the Piagetian classification tasks were administered over a four-week period in the fall of 1975. They were administered

in the morning hours of the kindergarten day.

The Starkweather Originality Test for Young Children was individually administered to fifty kindergarten children. The children were given certain Piagetian classification tasks to perform to determine if they were able to classify according to color, shape and size and do true classification, multiplicative classification and class inclusion. The Starkweather Originality Test for Young Children and the Piagetian classification tasks were administered to each subject in the same testing session. The environment of each testing session was the same for each individual subject.

#### Interpretation of the Data

Data obtained from the administration of the Starkweather Originality Test for Young Children and the Piagetian classification tasks were treated statistically means of a point bi-serial correlation. The .05 level of confidence was used as a basis for rejecting or failing to reject the null hypotheses. The differences exhibited by male and female children between the scores on the Starkweather Originality Test for Young Children and the Piagetian classification tasks were treated statistically by means of a simple one-way analysis of variance which was computed to find the value of  $f$ . The .05 level of significance was used as a basis for rejecting or failing to reject the null hypothesis.



### Instruments

The Starkweather Originality Test for Young Children, Form A, was administered to fifty kindergarten children to determine creativity. The validity of the Starkweather test was demonstrated by comparing the test scores of children with scores which indicated their freedom of expression. Originality scores and freedom of expression are significantly related. A Spearman rank order correlation between the originality scores and the freedom scores yielded a coefficient of +0.687. On the basis of this finding, the Starkweather test was accepted as a valid instrument (Starkweather, 1974:1).

The Piagetian classification tasks were administered by using attribute shapes and wooden beads. These classification tasks were administered by using Piaget's clinical method. Flavell (1963:27) described the clinical method as follows:

There are certain characteristics common to Piaget's approach in all studies which go beyond mere observation of ongoing behavior. First, there is the presentation of some kind of task to which the child makes some kind of response. . . . As soon as the child makes his response, the experimenter will then ask him a question, pose a variation of the problem, or in some way set up a new stimulus situation. This new stimulus situation is in part a response to the child's response. That is, the experimenter selects some question or some task which he hopes, in the light of his experience and theoretical frame of reference, will clarify what lies beneath the child's response, will provide additional insight into the child's cognitive structure.

Piaget's cognitive tasks share certain common attributes: they involve manipulation of materials on the part of the child; the

experiments are carried out with a single child at a time and there is a definite method of questioning the child by the task administrator (Almy, Chittenden and Miller, 1966:132-136). Piaget has not developed standardized tests using cognitive tasks. There is some indication that tests are in the process of being developed by other researchers interested in Piaget's work (Flavell, 1963:361). However, many studies have been published in the professional literature replicating Piaget's work. These studies have used the various cognitive tasks Piaget previously designated and have confirmed the theories of development (Flavell, 1963:364).

#### MAJOR ASSUMPTIONS

Assumptions were that the Starkweather Originality Test for Young Children did measure creativity. A further assumption of this study was that the Piagetian classification tasks administered measured the classification abilities of kindergarten children.

#### ORGANIZATION OF THE REMAINDER OF THE STUDY

A survey of literature is presented in Chapter 2, which is divided into various sections: Creativity, Creativity in the Pre-school Child, Piaget's Background, Piaget's Theory, Piaget's Classification Theories, Related Classification Research and

Summary. The first two sections present a definition of creativity and its characteristics and attributes. Investigations of creativity in the preschool child are also presented. Piaget's background and theory of intellectual development through a discussion of the stage dependent and stage independent theories are reviewed in the third and fourth sections. The fifth section reviews Piaget's theories of the development of classification abilities in young children. Studies concerning classification and its relationship to creativity are reviewed in the sixth section, and the seventh section summarizes the review of literature.

Chapter 3 describes the procedure followed in securing and analyzing the data. Chapter 4 consists of an analysis of the findings from the data collected in the study. In Chapter 5 the summary, conclusions and recommendations are presented.

## Chapter 2

### REVIEW OF THE LITERATURE

Let not young souls be  
smothered out before  
They do quaint deeds and  
fully flaunt their pride.  
It is the world's one crime its  
babes grow dull, . . . .  
(Lindsay, 1914:69)

During the past decade little has been written about creativity in programs for young children (Butler, 1970:126). This paucity of literature on creativity indicates a lack of understanding of the importance of the abilities of young children. Enlightened scholars have periodically proclaimed the necessity for the development of creativity in citizenry in order for the civilization to survive.

Toynbee (1964:4) described the importance of developing and nurturing creativity when he stated:

. . . If society fails to make the most of this one human asset, or if, worse still, it perversely sets itself to stifle it, Man is throwing away his birthright of being the lord of creation and is condemning himself to be, instead, the least effective species on the face of this planet.

An interest in the development of creativity in young children led to this study, and a review of the literature was made to determine whether or not any existing work reveals a relationship

between creativity and the ability to perform certain Piagetian classification tasks in kindergarten children. The literature surveyed was organized under the headings of Creativity, Creativity in the Preschool Child, Piaget's Background, Piaget's Theory, Piaget's Classification Theories, Related Classification Research and Summary.

## CREATIVITY

Some research on creativity was cited as early as 1898, but it was not until the 1950's that much attention was paid to this very important area of investigation (Razik, 1967:304). Creativity is defined in a multiplicity of ways. One view is that creativity is the result of certain personality traits. This view turned researchers toward analyzing creative personalities in order to determine and isolate these traits. Such a view led Guilford into an investigation of personality traits through factor analysis and the development of tests to measure them (Golann, 1963:552). Creativity has also been viewed as a process which culminates in a new idea or thought. Looking upon creativity as a process has led to the development of stages in the creative process (Haefele, 1962:12-13). Creativity has also been investigated through diagnosing the way of life of certain personalities and developing lists of attitudes and actions displayed by creative persons (Torrance, 1962:66-67). Some authorities

consider creativity to be a product, a result of man's mind and hands. However, Rhodes (1961:309) stated, "There is no standard system for organizing artifacts according to idea value or degree of originality. Consequently, any artifact is called a 'creation' and mystery surrounds them all."

Guilford (1950:445), in his presidential address to the American Psychological Association, directed attention to the apparent lack of interest of psychologists and educators in the area of creativity. His plea led many researchers into an era of investigation of this little known area (Razik, 1967:304). Guilford (1950:446) stated, ". . . all individuals possess to some degree all abilities, except for the occurrence of pathologies."

Creativity is a complex term which involves a wide range of qualities and meanings. Rhodes (1961:305) defined creativity as:

. . . a noun naming the phenomenon in which a person communicates a new concept (which is the product). Mental activity (or mental process) is implicit in the definition, and of course, no one could conceive of a person living or operating in a vacuum, so the term press is also implicit.

Rhodes developed the "Four P's of Creativity," and out of forty definitions that he had researched, Rhodes realized that they fell into four categories: person, process, press (interaction with the environment) and products (1961:307). Kneller agreed with Rhodes in his classification of information about creativity. Kneller (1965:3) listed his classifications as "person who creates, . . .

mental processes, . . . environmental and cultural influences . . . and products." This study defines creativity on the basis of the above four classifications.

Characteristics of creative persons were developed from studies of famous adults who were designated as being creative in a particular area (Martinson and Seago, 1967:2). Unanimity among researchers as to these characteristics was not widespread and their definitions of the creative person were wide and varied. MacKinnon (1962:494) described the creative person as not only being open to experience but also intuitive about it. MacKinnon (1962:488) stated:

. . . The more creative a person is the more he reveals an openness to his own feelings and emotions, a sensitive intellect and understanding self-awareness, and wide-ranging interests many which in the American culture are thought of as feminine.

Carl Rogers (1959:75) described creativity as an openness to experience due to self-realization of the individual. Rogers (1959:72) defined creativity as "the tendency to express and activate all the capacities of the organism to the extent that such activation enhances the organism or the self." The self-actualizing person was the basis of Maslow's (1959:86) definition of the creative person. He stated:

My subjects were different from the average person in another characteristic that makes creativity more likely. Self-actualizing people are relatively unfrightened by the unknown, the mysterious, the puzzling, and often are positively attracted by it; i.e., selectively pick it out to puzzle over, to meditate on, and to be absorbed with.

Kneller (1965:62) listed traits which he believed produced creative persons. The traits were "intelligence, awareness, fluency, flexibility, and originality, . . . skepticism, playfulness, self-confidence, and nonconformity . . . ." Another survey of personality traits of creative persons was developed by Torrance (1962:66-67) who listed eighty-four personality characteristics which ranged from "accepts disorder" to "somewhat withdrawn and quiescent." Torrance relied heavily upon the work of Runner (1954:16) who had developed a list of attitudes which he originally labeled, "Creative Attitude." Runner listed the following as being the common attributes of the creative individual.

1. Seeks change and adventure. Any system he follows will be his own system.
2. Inclined to sloppiness and disorganization. May give meticulous attention to things important to him personally.
3. Tendency not to plan activities, inclined to wait for developments, and changes plans quickly. Doesn't expect to be able to predict in detail and probably won't try.
4. Questions rules and authority.
5. Inclined to be chummy with strangers, not confining social activity to any certain groups. May talk too much or refuse to talk if he is interested in something else.
6. Thinks of people as individuals; is tolerant and open-minded and has faith in goodness of people as individuals.
7. Holds conformists in some disdain.
8. Disciplines himself to accomplishment of specific results; acts impulsively and fails to stick to any one course of action.

Creativity often becomes a study of personality with emphasis upon motivation in creative individuals and personality characteristics. Golann (1963:554) reported that two viewpoints are apparent



when studying creativity as personality traits. One viewpoint reveals creativity as a by-product of repressed impulses and the other viewpoint describes creativity as a personality characteristic which emerges as the person matures.

Most of the work aimed at defining creativity as a process was based on the work of Guilford. Tests were developed by Guilford from creativity trait measures that he had isolated (1959:158-159). Guilford (1962:156) became interested in the study of creativity when he was a graduate student working in a psychological clinic. This experience convinced him that an intelligence quotient (IQ) was a very poor indicator of a child's total abilities and that IQ tests did not give information about originality of thinking. When Guilford (1962:156) began the study on creativity a method was sought which would identify specific abilities. Razik (1967:304) stated that in seventeen years of research Guilford was able to redefine intelligence to include creative behaviors. Through the use of factor analysis Guilford determined 120 separate dimensions of intelligence. Guilford made the distinction between convergent thinking abilities and divergent thinking abilities. Traditional measures of intelligence are concerned with convergent thinking and giving the correct answers. Divergent thinking moves toward creativity into unexplored areas away from answers that are known (Razik, 1967:304). Guilford (1959:160) stated:

Most of the aptitude factors identifiable as belonging in the category of creativity are classifiable in a group of divergent-thinking abilities. These abilities, by contrast to convergent-thinking abilities, emphasize searching activities with freedom to go in different directions, if not a necessity to do so in order to achieve an excellent performance.

Earlier investigators tended to equate creativity with problem solving. Dewey (1910:72) developed a problem solving model for creativity with the following model:

1. Awareness that a problem exists
2. Analysis of the problem
3. An understanding of the nature of the problem
4. Suggestions for possible solutions
5. Testing the alternative solutions and accepting or

rejecting them.

Another model similar to Dewey's was developed by Wallas (1926:46) in his book, The Art of Thought. His stages of creative thought were:

1. preparation
2. incubation
3. an understanding of the nature of the problem
4. suggestions for possible solutions
5. testing the alternative solutions and accepting or rejecting them.

Wallas believed that the pattern of creative thinking was seldom clear cut and varied from stage to stage. Patrick (1935) verified Wallas' four stages through a study comparing the working habits of poets and nonpoets (Russell, 1956:311).

The third category of viewing creativity is as an outgrowth of environmental or cultural influences. The creative individual does not live in a vacuum but interacts with parents, siblings, peers and with societal expectations. Gowan (1972:11) found that significant parent interaction with the individual was helpful to development of the creative individual. Hitschman (1956:19) in a study of great men noted:

Several subjects show a traumatic experience in early childhood as a possible source of their creativity. All were excessively day-dreamers. Many showed a certain bisexuality or femininity or at least some conflict in masculine-feminine identification. Their productivity can be compared to an act of childbirth.

A number of doctoral dissertations were reported by Gowan (1972:11), which focused on relationships between home environment and creativity. Ellenger (1964) studied the home environment of 450 fourth graders. Conclusions of this study were that the parents of creative children interacted more with their children and used less physical punishment than did parents of noncreative children. Orenstein (1961) discovered through his study on maternal restrictiveness that neither permissiveness nor loving attitude correlated with creativity.

Gowan (1967:11) offered the theory that creativity is often considered to be the opposite of authoritarianism. Gowan stated:

. . . This view of creativity, like the previous suggests that children can be helped to preserve their creativity by non-authoritarian attitudes on the part of parents and teachers, especially by not having negative evaluations put upon their initial efforts.

Another theory reported by Gowan (1967:15) was that the oedipal crisis is the generating force of creativity. Gowan stated that a child who is close to the parent of the opposite sex between the age of four to seven will be more creative than children who do not have this warm relationship.

Creativity as measured by the product involved is the fourth area of investigation. Rhodes (1961:309) concluded that a product can be an idea which is communicated to others through the media of paint, clay, stone or fabric. The problem with viewing creativity through its products was that there were no standards of measurements for doing so. Ghiselen (1963:38) concluded:

My hypothesis is that an invention or discovery is truly creative insofar as its coming into being is really production of insight, rather than reproduction or copying of insight in any degree whatever.

Ghiselen maintained that the products measured for creativity must be items that were spiritual or physical that had been developed by human endeavor (1963:31). Ghiselen (1963:42) also proposed that the measure of a product be the way it restructures human enlightenment. Data gathered indicated that no single criterion has yet been developed for evaluating products (Taylor, 1964:7).

Another area of study on creativity is on its relationship to

intelligence. Getzels and Jackson (1962:13-76), in their study of adolescents at the University of Chicago Laboratory School, contrasted students who scored high on IQ but low on creativity with students who scored high on creativity but low on IQ. They discovered that intelligence tests were not effective measures of creative potential. They found some correlation between creativity and IQ up to a certain level of IQ, but discovered that above a certain level there was no correlation between creativity and intelligence.

Mackinnon (1962:493) commented that creative individuals perform better than the average on intelligence tests but the correlation between their intelligence and creativity tended to be low. Taylor and Holland (1962:91-102) reported a positive but low correlation between intelligence test scores and creativity test scores for the general population, but almost no correlation at the higher levels. Torrance's (1962:4-5) research among public school children of various ages confirmed Getzels and Jackson's data on correlation above the 120 IQ. Torrance indicated that if gifted children were identified solely on the basis of IQ then 70 percent of the most creative would be eliminated. Torrance stated that the lack of relationship between measures of IQ and creative thinking was apparent. Any relationship was viewed as little more than chance by Torrance (1962:59). Mackinnon (1962:488) concurred with Torrance and

further stated, "It just is not true that the more intelligent person is necessarily the more creative one."

### CREATIVITY IN THE PRESCHOOL CHILD

Creativity is universal in children, but among adults it is almost nonexistent (Anderson, 1959:xii). Something happens to children along the way to stifle their creativity. Kubie (1958:98) reported that the way children are guided through the ages from three to six is a matter of great importance.

Investigations of creativity in young children have been sparse. The young child was generally considered to be incapable of reasoning and therefore was thought not worthy of investigation except by a few enlightened educators. Miller (1909:68-70) in the publication, The Psychology of Thinking, suggested that educators were underestimating the abilities of young children. Studying creativity in young children may be more profitable research than studying creativity in adults. Maslow (1965:21) stated that in studying children contaminating problems are eliminated.

Early research on creativity in children employed the ink block technique. White (1931:76) reported that subjects were required to name all the objects suggested by an ink block--a formless smudge of ink. Investigations were then developed around the names given by

children to the ink blots in relationship to age, sex and individual differences.

One important early study of young children's creativity was developed by Andrews at the University of Iowa in 1930 (Torrance, 1964:73). Andrews recognized the different mental abilities present in intelligence and in creativity and could see little correlation between them. Schools should provide for the difference between creativity and intelligence by providing for their fullest development according to Andrews. A variety of methods was used by Andrews in investigating creativity in young children (Torrance, 1964:73). Three were developed in which geometric lines and figures were presented by a tachistoscope. Each child observed the picture of the form for a moment and reported what was viewed. Scores were assigned on the basis of verbal responses (Markey, 1935:3). Torrance (1964:73) reported,

. . . The following kinds of observations were made of the imaginative play of children from two to six: imitation, experimentation, transformation of objects, transformation of animals, acts of sympathy, dramatizations, imaginary playmates, fanciful explanations, fantastic stories, new uses of stories, constructions . . . .

Many attempts to evaluate creativity in the young child were made through the medium of art. Grippen (1933) analyzed paintings of children and their conversation while painting. Conclusions from these observations were that children under the age of five did not have any creative imagination except in rare cases. However, some

children at the age of five were comparable to those of seven in their creative imaginative ability. Grippen's sample was only forty-eight children which severely limited his study (Torrance, 1964:71-72).

Markey (1935) was an early observer of creativity in the pre-school. Methods were developed by Markey to observe children in order to evaluate creative performance in standardized situations such as imaginative games, housekeeping games and blockbuilding. Markey concluded that one test could not evaluate all the creative responses of a young child. Children's ages also had a great influence on the scores of Markey's tests. Younger children scored higher on the housekeeping game than did older children because the housekeeping materials were better suited to the interest level of the young children (Markey, 1935:123). Markey concluded that the total amount of imaginative behavior increased with age (1935:135). Conclusions from this study were that more adult-directed imaginative activities at earlier levels might promote imagination (Markey, 1935:138).

The imaginative tendencies of young children were recognized and early childhood was labeled "the age of imagination" (Griffiths, 1935:6). Griffiths stated:

. . . The long periods of daydreaming, the tendency to "invent imaginary companions," to construct a world of fairyland into which temporarily to retreat from the world of sense, to dramatize in play remembered scenes, to murmur aloud long conversations with toys and visualized, but non-present objects or persons, all these tendencies have been observed but, being usually misunderstood, have been largely disparaged . . . .



Griffiths concluded that imaginative activities added to problem solving and intellectual activities.

One of the imaginative activities of young children which received attention in research was the presence of the imaginary companion. Hurlock and Burstein (1932:380-391) made a study of this phenomenon. Harriman (1937:368) reported that one third of all children between the ages of three and nine years of age have imaginary companions. Markey (1935:35-57) found that children with older peers or siblings and from a high socio-economic background displayed the most imaginative behavior.

Authorities have determined stages of development of creativity in young children. These stages vary according to each researcher. McMillan (1924:7-8) identified three stages in the development of imagination: a sense of beauty, reality and a combination of beauty and reality. The drawings of children were analyzed by Griffiths (1935:209-10) who identified eleven stages in their drawings which she related to creativity.

1. A stage of undifferentiated scribble.
2. Rough geometrical shapes appear, usually circles and squares. Names are sometimes given to these, e.g. doors, windows, apples, rings.
3. The making of further objects by the combination of lines and squares, and separately of circles. The circles and squares are not yet combined together.
4. Combination of circles and lines to make many other objects, of which one of outstanding interest is the human figure (early stages only).
5. Juxtaposition of many objects rapidly drawn and named, but often unrecognizable.

6. Tendency to concentrate on one object at a time, bolder work, care taken, a degree of detail present.
7. Further juxtaposition, but clear subjective association usually present, work recognizable.
8. Partial synthesis. Some items are shown in definite relation to each other.
9. The pure picture. A tendency to draw one picture only.
10. Multiplication of pictures. Pure joy of representation.
11. Development of a theme by means of a series of pictures.

Ligon, as part of the research for the Union College Character Research Project, attempted to establish age characteristics for development of the imagination from birth to sixteen. Ligon (1957:84) indicated that children developed their imagination during the first year. During the years from two to four the child learned about his world through interaction with the environment (Ligon, 1957:105). The child repeated what he had learned about his world through interaction with his environment (Ligon, 1957:105). The child repeated what he had learned through imaginative play. Conclusions of this study were that children from age four to six have a good imagination and learn adult roles through imaginative play (1957:127).

Research evidence available and observations of investigators indicated creative imagination during early childhood seemed to reach a peak between four and four and one-half years of age, and was followed by a drop at about age five when the child entered school for the first time. This drop had been regarded as the inevitable phenomenon of nature. There were indications, however, that this

drop in five-year-olds was a man-made rather than a natural phenomenon. Andrews (1930) concluded that the correlations between IQ and creativity and between mental age and creativity were so low that very little relationship existed. Total imaginative scores were highest between four and four and one half years according to Andrews. There occurred a lowering of imaginative scores when the child entered kindergarten at the age of five (Torrance, 1964:75). Markey (1935:135) reported that the total amount of creative behavior increased as children grew older during the preschool period. During her work with kindergarten children, Pulsifer (1963:23) found that performance score declines in five-year-olds were not a natural developmental change but rather a societal one. The standards imposed upon the child in teaching him to conform were, in Pulsifer's opinion, the contributing factor.

Another study developed about preschool children concluded that IQ was related positively with the degree of creative use of play materials. McDowell and Howe (1941:321-326) studied fifty preschool children of two to four years of age. They wanted to ascertain if there was a relationship between the sex, the chronological age, and the intelligence of the children of this group and their creative ability as manifested in their use of three play materials: blocks, paints and clay. They came to the following conclusions:

a. There was no significant difference found between boys and girls, either in the frequency of choice or in the degree of creative attainment with blocks.

b. Girls not only elected to use paints more than did boys, but they displayed a greater degree of creativeness in their use within the definitions of this term applied in the present study.

c. Although the girls chose to use plastic clay more frequently than did boys, there was no significant difference between the degree of creativeness displayed by the two sexes in the use of this material.

d. Age was found to be positively correlated with the degree of creative ability with which the preschool children used each of the three play materials--blocks, paints, and clay.

e. The intelligence quotient of the children was correlated positively with the degree of creative use of all the play materials of the study.

When Guilford (1950:446) gave his presidential address before the American Psychological Association he said, "Creative acts can therefore be expected, no matter how feeble or how infrequent, of almost all individuals." Starkweather (1971:246) assumed the same position with this statement:

If one assumes that every child is born with some potential for expressing himself freely, then one must assume that this first exploratory study included children in whom this freedom had been encouraged and other children in whom this freedom still lay dormant or had been stifled. The findings suggest that this encouragement or stifling can occur before a child is five years of age and therefore, a search for the factors which influence the development of creative ability should start with infants and preschool children.

Recent studies have been developed around freedom of expression, originality and nonconformity traits in children (Starkweather, 1971:245-255). Starkweather and Cowling (1967:229-238) in research at Oklahoma State University chose nonconformity for one study.

Conclusions from a review of the literature were that nonconformity was a trait exhibited by creative persons. Instruments were developed by Starkweather which would allow the child being tested to be free to use conforming or nonconforming behavior. One was a color preference test which was designed to measure social conformity and the other test was a form board task in which the child was measured on conformity in an impersonal situation (Starkweather and Cowling, 1967:238). The researchers determined that only one out of eight of the subjects was consistently free in the use of conforming or nonconforming behavior.

Another attribute of the creative person is a willingness to accept a risk (Starkweather, 1971:249). Starkweather developed a Target Game which is an instrument designed to measure children's willingness to take a risk on hard tasks. Originality was considered to be a trait exhibited by a creative individual. Starkweather devised a test to measure this trait: The Starkweather Originality Test for Young Children.

The beginnings of creative thinking may be found as the young child manipulates and explores the environment (Torrance, 1963:5). At an early age the child takes experiences apart and puts them together into new combinations with an imaginative use of gestures, sounds and words much as the child plays with toys (Butler, 1970:127). Jean Piaget (1952:357) stated that the beginnings of cognition were

developing as the child interacted with the environment.

### PIAGET'S BACKGROUND

For more than forty years Jean Piaget has been studying the intellectual development of children (Flavell, 1963:1). Piaget is considered by many to be this century's most important theorist on the development of the child (Baldwin, 1967:171).

Interest in investigating children's intelligence first began when Piaget worked with Simon at the Binet laboratory in Paris, standardizing tests of reasoning (Morrison, 1976:60). A fascination with the answers that children gave to test questions and, specifically, incorrect answers triggered Piaget's interest. Piaget engaged his subjects in conversation patterned after psychiatric examining procedures with the aim of discovering something about reasoning processes. Piaget's approach to the development of intellectual theories from observing children reflected a background of biological training (Baldwin, 1967:172).

A very precocious child, Piaget was early attracted to the study of biological science (Flavell, 1963:1). Piaget published an article about an albino sparrow at the age of ten (Morrison, 1976:60). As a result of subsequent papers published on the study of mollusks, Piaget was offered the position of curator of the mollusk collection in the Geneva museum while in secondary school (Favell, 1963:2).

Studies in biology were continued and Piaget received the bacca-laureate degree at the age of eighteen and a doctorate degree by the age of twenty-one (Morrison, 1976:60). Throughout the formative years Piaget read avidly and broadly in the fields of psychology, philosophy, religion, sociology, and of course, biology (Flavell, 1963:2). Philosophy became a great passion when Bergson's ideas on creative evolution were introduced to Piaget by a friend (Hall, 1970:25). Piaget became convinced that "most of the problems in philosophy were problems of knowledge, and that most problems of knowledge were problems in biology."

Following work at Binet's laboratory in Paris, Piaget accepted a position as Director of Studies at the Institute J. J. Rousseau in Geneva, Switzerland, in 1921 (Baldwin, 1967:171). Piaget has remained in this position throughout the ensuing years. It was from there that investigations on children's intelligence were developed which made Piaget famous before the age of thirty (Flavell, 1963:3).

The majority of his early studies of children were developed around Piaget's observations of his own three children from birth onward. Those observations were published in The Origin of Intelligence in the Child and The Child's Construction of Reality (Isaacs, 1960:65). From 1920 to 1950 Piaget was engaged in research with children in an attempt to discover the development of human

intelligence (Ginsburg and Opper, 1969:10). Piaget still writes, teaches, guides doctoral candidates and directs the Institute for Psychology and the International Center of Genetic Epistemology in Geneva, Switzerland (Hall, 1970:26).

## PIAGET'S THEORY

Piaget's theory of the development of intelligence was comprised of two basic components: the stage dependent theory and the stage independent theory (Honstead, 1968:134). The stage dependent theory was developed around the ideas which control and form the basis for the stage independent theory. The latter theory related the stages of growth from birth to adolescence.

### Stage Independent Theory

Piaget's early training as a biologist influenced research significantly. As a biologist Piaget was aware of organisms interacting with and adapting to their environments (Morrison, 1976:61). Through early work with mollusks Piaget was aware that they were constantly changing to environmental conditions. Piaget theorized that intelligence developed much the same way as the human organism interacted and reacted to changes in its environment. Piaget (1952: 3-4) stated:



Intelligence is an adaptation. In order to grasp its relation to life in general it is therefore necessary to state precisely the relations that exist between the organism and the environment. Life is a continuous creation of increasingly complex forms and a progressive balancing of these forms with the environment. To say that intelligence is a particular instance of biological adaptation is thus to suppose that it is essentially an organization and that its function is to structure the universe just as the organism structures its immediate environment.

Cognitive acts were viewed by Piaget as the individual's adaptation to his environment. Pulaski (1971:7) wrote, "Adaptation has a dual nature; it consists of twin processes which go on continuously in all living organisms." These complementary processes are assimilation and accommodation.

Piaget theorized that the child develops a view of the world through adaptation or interaction with the environment. This world view is a structure of the mind which Piaget labeled a schemata. Wadsworth (1971:10) said, "Schemata are structures that are the mental counterparts of biological means of adapting." Schemata can be thought of as concepts or categories that are constantly changing or restructuring. Baldwin (1967:175) explained schemata in this manner:

. . . Schema is a complex concept encompassing both overt motor behavior patterns and internalized thought processes. It includes simple, predictable responses practically at the reflex level, but also complex organizations like a person's understanding of the number system.

When confronted with new information or stimulus the child fits the stimulus into his schemata or view of the world. Assimilation is an organism-inward process. The organism's capability of handling new information in the light of old understandings is due to assimilation. Accommodation is an organism-outward process. The world view of the organism must be changed in order for it to adjust to this new information. When the organism does this it accommodates to the new information (Baldwin, 1967:176). Assimilation is constantly balanced by accommodation. Isaacs (1960:19) explained it this way: "This dual process, and the endeavor to maintain an equal balance between the two sides, are for Piaget the chief controlling factors of intellectual growth."

As the active organism receives stimuli and adjusts a schemata to it, there is a search for equilibrium or a balance between assimilation and accommodation. This balance of the two functions was labeled equilibration by Piaget (1967:8). This process is necessary to insure an efficient interaction between a child and the environment. Growth or development becomes an equilibration at one level to equilibration at another level (Pulaski, 1971:9). Disequilibrium is evident when an imbalance occurs between assimilation and accommodation. When disequilibrium occurs the child is motivated to seek equilibration, or a balance between assimilation and accommodation. Wadsworth (1971:18) concluded, "Thus,

equilibration can be viewed as a state of cognitive 'balance' that is reached at assimilation." Disequilibrium happens when the organism is stimulated to strive for higher stages of equilibration or cognition (Pulaski, 1971:9).

Cognition develops as a result of four interacting factors according to Piaget and Inhelder (1969:154-159). These factors help to explain individual differences in children's performances on the Piagetian tasks (Lavatelli, 1970:45). These factors are (1) Equilibrium, (2) Maturation, (3) Experience and (4) Social transmission.

The child uses developing schemata in the same manner as developing muscles and limbs. Pulaski (1971:9) explained, "Piaget stresses very strongly the importance of maturation in mental as well as physical development." Maturation is influenced by the child's genetic endowment and the environmental situation (Morrison, 1976:66). Maturation plays a large part in the changes in schemata.

Another factor important to cognition is the experience of the child. This is direct experience with concrete items such as balls, balloons, dolls, toys and animals. The child who has direct experience with an item can then form an image of that object and then act upon it in thought (Pulaski, 1971:11).

The last factor in cognition is social transmission. Much information is transmitted to children through verbal interchange with parents, teachers and peers. Verbal information that is

contradictory can disturb the child's equilibration. As the child seeks to find an answer to the disturbing information higher equilibration is achieved (Pulaski, 1971:11). Equilibration is the critical factor in the child's cognitive development. Cognition develops when the child's maturation, experience and social transmission cause conflict to this balance between assimilation (new information) and accommodation (already established structures of information) (Honstead, 1968:136).

Senn (1969:8-9) analyzed Piaget's theory as follows:

Piaget views the growth of the structures of knowledge as preceding over time beginning in early infancy and ending in adolescence. Not only is there a distinct beginning and ending in the schema he presents, but there are also certain critical periods along the way.

### Stage Dependent Theory

Piaget divided intellectual development into stages or periods of growth. These periods are the stage dependent aspect of Piaget's theory. The criteria of each stage or period were defined by

Inhelder (1969:27):

1. Each stage involves a period of formation (genesis) and a period of attainment. Attainment is characterized by the progressive organization of a composite structure of mental operations.
2. Each structure constitutes at the same time the attainment of one stage and the starting point of the next stage, of a new evolutionary process.
3. The order of succession of the stages is constant. Ages of attainment can vary within certain limits as a function of factors of motivation, exercise cultural milieu, and so forth.

4. The transition from an earlier to a later stage follows a law of implication analogous to the process of integration, preceding structures becoming a part of later structures.

Approximate ages for the various stages were set by Piaget.

Honstead (1968:137) explained this further when she said, "However, these chronological ages are affected by such things as inherited intelligence, previous experiences, and culture."

Piaget's theory divided intellectual development of the child into four separate stages or periods (Ginsburg and Opper, 1969:26): (1) Sensorimotor (birth to two years), (2) Preoperational (two years to seven years), (3) Concrete operational (seven years to eleven years) and (4) Formal operational (eleven years and above).

The preoperational period is discussed at length in this review of literature since it is the period which generally encompasses the kindergarten age child. However, a brief overview of the other stages is important as each stage builds and overlaps onto each other stage or period.

Sensorimotor Period. The sensorimotor period begins at birth and continues until the child is about two years of age. The child uses senses and reflexes to begin building a view of the world. Almy, Chittenden and Miller (1966:17) stated that in this period "knowledge could be said to consist of the repertoire of actions the child uses in response to the objects he encounters." This is the period before the child acquires language and is the basis for all the

other stages (Honstead, 1968:137). The foundation for the child's future intellect and future life is established during this stage of development. Morrison (1976:68) listed the major characteristics of children during this period:

1. Dependency on and the use of innate reflexive actions.
2. Initial development of object permanency (the idea that objects can exist without being seen).
3. Egocentricity whereby the child sees herself as the center of the world and believes events are caused by her.
4. Dependence upon concrete representations (things) rather than symbols (words, pictures, etc.) for information.

Preoperational Period. The preoperational period spans the age between two to seven years. Piaget divided this period into two parts: the preconceptual stage which dominates the thought of the child from age two until four; and the intuitive stage which generally encompasses the child from age four to seven (Pulaski, 1971:51).

At this period of development the child does not employ logical operations but rather tends to orient activities on the basis of appearances. This causes the child to be misled by what is seen (Raven and Salzer, 1971:631). The symbolic representation of things is evidenced by the presence of language, dreams and the advent of symbolic play (Elkind, 1973a:9). The single most important development during the preoperational period is the development of language. Language opens many new avenues of experience for the child. Wadsworth (1971:65) suggested that there were two different classes of preoperational speech: egocentric speech and socialized speech.

From the ages of two to four the child's language is egocentric. The child speaks without intending communication. In the latter part of the preoperational period from ages four to seven the language of the child is socialized. Children's conversations at this level clearly constitute an exchange of ideas.

Egocentricity leads to animism for the child in the preoperational stage of development. The child believes everything in nature is alive and endowed with purpose (Ginsburg and Opper, 1969:98). At the beginning of the preoperational period the child tends to identify words and symbols with the object they represent. The child becomes upset when someone steps on a stone that has been designated as a dog or friend (Elkind, 1973a:9). The preoperational child's thinking and behavior are egocentric too. This egocentricity makes it impossible for the child to take the role or see the viewpoint of another. The preoperational child never questions thoughts as the child believes everyone thinks the same way (Wadsworth, 1971:71).

Transductive reasoning is another characteristic of the preoperational period. The child moves from a perceptual event to another perceptual event without focusing on the process of change from one state to another (Morrison, 1976:69).

Reversibility is the most clearly recognized characteristic of intelligence according to Piaget (1972:61). Preoperational children are not able to reverse thinking processes. Perceptions of the

child at the preoperational level are very rigid.

Centration is another trait of preoperational thought. The child presented with a visual stimulus tends to center on a limited perceptual attribute of the stimulus. This, in turn, causes the child to assimilate only the superficial aspects of the stimulus (Flavell, 1963:157). Egocentrism, centration, transformation and irreversibility are closely related and early preoperational thought is representative of them.

Intuitive thought is a bridge between the preconceptual stage and the concrete operational period. Piaget (1967:30) stated:

In place of logic he substitutes the mechanism of intuition--simple internalization of percepts and movements in the form of representational images and "mental experiences"--which prolongs the sensorimotor schemata without true rational coordination.

During the intuitive stage the child acquires a way of dealing with problems. Baldwin (1967:245) stated that the child feels the way to the correct answer but still does not have a clear concept of the problem and its solution. The preoperational period represents the very beginnings of cognitive representations in the form of images and symbolic play to an organized conception of the world.

Concrete operations. The concrete operational period follows the preoperational period. The concrete operational child from ages seven to eleven or twelve develops logical operations. The child in the concrete operational period is no longer tied to immediate



perceptions but can utilize mental images and symbols during the thinking process. The child in this stage cannot think about problems in a formal way but can reason logically in a concrete way (Lavatelli, 1970:33-34).

The concrete operational child can begin to understand that change involving physical appearance does not necessarily change quality or quantity. The ability to conserve is present at the concrete operational level (Morrison, 1976:70). This child can also reverse operation. Lavatelli (1970:34) stated, ". . . the mind can reverse an operation, going back to the starting point and comparing it with the present state."

Morrison (1976:71) listed mental operations which the child can do during the concrete operational period:

1. Seriation which begins with putting objects in order according to some criteria (small to large, short to tall)
2. transitivity
3. classification of objects, events, and time according to certain characteristics
4. classification which involves multiple properties of object
5. class inclusion operations
6. complementary classes

Formal operations. The child from the age of twelve through fifteen develops the ability to solve problems through logical operations. A child in this stage can deal with hypothetical situations as well as actual ones (Raven and Salzer, 1971:632). Evans (1973: 93-94) described formal operations as: "The ability to generate all

possible solution hypotheses and then check the validity analysis is the hallmark of the period of formal operations."

### PIAGET'S CLASSIFICATION THEORIES

Piaget's theory of cognitive growth was based on the idea of a fixed order in which concepts are acquired. These concepts are determined by the child's ability to use increasingly complex logical operations (Kofsky, 1966:191). One of these logical operations is classification which becomes clearly defined in the concrete operational period of the child between the ages of seven to eleven or twelve (Evans, 1973:91). However, the beginnings of classification can be traced to the sensorimotor period (Piaget and Inhelder, 1969:102). Piaget defined classification as ". . . a relation of resemblance between members of the same class, and one of dissimilarity between members of different classes (Inhelder and Piaget, 1964:5).

Beller (1973:562) stated, "Intelligence is the ability to classify." This investigator implied that if the capacity for classification was not evident in the child that the higher aspects of intelligence were not possible. Kohlberg (1968:1055) informed those interested in young children that Montessori identified intelligence with the ability to classify. Montessori materials involved operations based on classification (Beller, 1973:537). Maria Montessori believed that the ability to classify developed as a result of sensory

training (Lavatelli, 1970:82). According to Lavatelli (1970:83) Piaget believed that true classification demanded more than perceptual judgments; it also demanded mental operations.

Ginsburg and Opper (1969:121) reported Piaget's criteria for developing classes were as follows:

1. No object is a member of both classes simultaneously . . . .
2. All members of a class share some similarity. . . .
3. Each class may be described in terms of a list of its members. . . .
4. The defining property of a class determines what objects are placed in it. . . .

Inhelder and Piaget (1964:v-vi) studied classification in the child from birth through adolescence. They described the following stages of the development of classification: (1) graphic collections, (2) non-graphic collections, (3) class inclusion--all and some, (4) class inclusion and hierarchical classifications, (5) complementary classes and (6) multiplicative classes. Inhelder and Piaget's (1964:17-196) six stages were defined by them to be representative of three classification categories: pre-classification, quasi-classification and true classification.

### Pre-Classification

Piaget stated that there is a simple type of classification in the sensorimotor period which is based on the child's motor activities (Piaget, 1952:185).

Observation 106. In the evening of 0.3 (13) Laurent by chance strikes the chain while sucking his fingers (Obs. 98) he grasps it and slowly displaces it while looking at the rattles. He then begins to swing it very gently which produces a slight movement of the hanging rattles and an as yet faint sound inside them. Laurent then definitely increases by degrees his own movements: he shakes the chain more and more vigorously and laughs uproariously at the result obtained. On seeing the child's expression it is impossible not to deem this gradation intentional.

Piaget reasoned that the infant sees the difference in a small pushing of the chain and a large push. The child can relate the small push with a soft rattling of the chain and a large push with a loud rattling of the chain (Ginsburg and Opper, 1969:49). The child of age two to four begins to classify objects in a very primitive way. This child cannot sort objects into classes, but instead, he places objects in a pattern which has no definite basis of classification (Inhelder and Piaget, 1964:18). A string of blocks or toys may be placed so they make a visually pleasing pattern to the child. Inhelder and Piaget (1964:18) called this a "graphic collection." This cannot be called a classification, but rather a collection of objects. However, the child is beginning to classify in the mind as objects are manipulated (Sime, 1973:46).

#### Quasi-Classification

This category encompasses the non-graphic collection stage labeled by Inhelder and Piaget (1964:47-48). Children in this stage appear to be classifying, but a closer examination reveals that true

classification is not present. Children in this stage of classification can sort elements of a class according to major attributes but the arrangements may look like patterns in the pre-classification category. Sime (1973:46-47) described the actions of the children at this stage of classification:

But, even when they achieve separation into major classes, they cannot cross-classify, nor can they see small classes within large classes, e.g. they cannot subclassify red, blue, and yellow triangles within the class of triangles: yet, if they are asked to do so, they can reclassify according to colour . . . . Finally, at this stage, there is still a tendency to try to classify an object according to its use rather than its properties.

### True Classification

Children from seven to twelve years of age are capable of true classification. This category contains the stages labeled by Piaget as (1) class inclusion, all and some, (2) class inclusion and hierarchical classifications, (3) complementary classes and (4) multiplicative classifications (Inhelder and Piaget, 1964:59-165). Ginsburg and Opper (1969:127) stated that the child in this stage bases his ability to do true classification upon concrete items. The child understands the inclusion relations of objects seen but cannot classify imaginary objects until a much later age. A perfect example of class inclusion is the classic inclusion task described by Inhelder and Piaget (1964:107-09).

. . . [Teacher:] A little girl takes all the yellow primulas and makes a bunch of them, or else she makes a bunch of all the primulas . . . . Which would make a bigger bunch: one of all the primulas or one of all the yellow primulas? [Girl:] All the primulas, of course. You'd be taking the yellow ones as well! [Teacher:] And all the primulas or all the flowers? [Girl:] If you take all the flowers, you take the primulas too.

The age norms for classification stages were approximate.

Ginsburg and Opper (1969:134) described the ages in this manner:

. . . A particular child may pass from stage 1 to stage 2 at 6 years, and not necessarily at 4 or 5 years. One child may spend three years in stage 1 while another child may spend four years in the same stage. Piaget does maintain, however, that the sequence of development is invariant. The child must first be characterized by stage 1 before he can advance to stage 2 and then to stage 3. Piaget also points out that a child may not necessarily be in the same stage of development with respect to different areas of cognition. That is to say, a child may be in stage 1 with respect to classification, and in stage 2 of number development.

The work of Lavatelli (1970:44) was based on Piaget's findings on classification. Five stages of classification were described by Lavatelli as (1) Simple sorting, (2) True classification, (3) Multiplicative classification, (4) All-some relation and (5) Class inclusion relation.

Lavatelli defined simple sorting as the first stage where a child sorts or groups objects according to one single attribute, usually color, shape or size (1970:44). True classification, according to Lavatelli (1970:44), was the abstraction of a common attribute in a group of objects and finding that same attribute in other objects. Lavatelli placed multiplicative classification in a category which

demonstrated the fact that a child can classify by more than one property at a time. The all-some relation in which a child distinguishes classes on the basis of a property belonging to all members of the class was the fourth stage of development (Lavatelli, 1970:44). The latest stage of development was called class inclusion relation because at this stage a child forms subclasses of objects and includes them in a larger class (Lavatelli, 1970:44). The labels that Lavatelli gave to the different stages of classification were used to describe the stages of classification in this study.

#### RELATED CLASSIFICATION RESEARCH

Sigel (1971:173) compared "underprivileged" with "privileged" children in the development of classification. Sigel concluded that "underprivileged" children used color classification more often than did "privileged" children.

Thompson (1941:119-126) studied the sorting ability of sixty children of grades one through six. The purpose of this investigation was to study characteristic performances and verbal responses of children on a group of sorting tests. Thompson (1941:125) concluded that performance on these tests revealed significant differences between the older and younger children. Older children were able to form categories from the objects, whereas the younger children classified objects belonging together in concrete situations and could

see no objects that belonged together. Thompson believed this study indicated that generalizing ability increases with the age of the child (1941:125).

Kofsky (1966:201-203) did an analysis of eleven classification tasks with children from ages four to nine. The classification tasks were all derived from Inhelder and Piaget's work on classification. Kofsky reported that the observed order of task difficulty was in agreement with the results obtained by Inhelder and Piaget. These results confirmed Piaget's work with respect to classification.

Kofsky and Osler (1967:928) investigated the behavior of five, eight and eleven-year-old children in order to ascertain the effects of age, number of stimuli and number of stimulus-dimensions on three aspects of sorting behavior. The sorting behavior studied was the ability to classify stimulus sets and to shift criteria after initial classification. The size of the class formed was also investigated.

Kofsky and Osler (1967:935-936) concluded the following:

. . . (a) children between 5 and 11 years are able to sort sets into logical groups; (b) 5-year-old children sort more poorly than the two older groups and experience great difficulty in shifting criteria for sorting; (c) all Ss exhibit pronounced attribute preferences, but these biases have a more restrictive effect on the younger Ss; and (d) within the range of ages and stimulus values tested, uncertainty and structure have little effects on the frequency of adequate sorts and shifts.

A review of the literature has not produced any research designed specifically around the relationship between creativity and the ability to do Piagetian classification tasks by kindergarten



children. Two studies were found which investigate the relationship between creativity and Piaget's theories.

Sliker's (1972:120-128) doctoral research on the creativity of adults in light of Piagetian theory found a positive correlation between egocentric thought on the Piagetian tasks and verbal originality. Conclusions of this study were that the origins of creative thinking could be found in the preoperational thought processes.

O'Bryan and MacArthur (1969:33-35) investigated the relationship of reversibility (as described by Piaget) to intelligence and creativity in nine-year-old boys. A factor analysis reduced the Piagetian and Torrance batteries to measures of reversibility and creativity. These were then combined with other variables for statistical analysis. Reversibility took two uncorrelated forms: reversibility of classes and relations. Reversibility of classes was found to be related to intelligence (O'Bryan and MacArthur, 1969:44).

#### SUMMARY

The purpose of this study was to determine whether or not there is a relationship between creativity and the ability to perform certain Piagetian classification tasks in kindergarten children. A survey was made of the literature concerning the general aspects of creativity, creativity in the preschool child, Piaget's theories of cognitive development and classification, and the relationship

between creativity and classification.

The research revealed a major emphasis on creativity, creativity in the preschool child, Piaget's theory and Piaget's classification theories. However, there was no information found about creativity and its relationship to classification. Classification studies tended to substantiate Piaget's theories about the development of classification in children. One study concluded that creativity began in the preoperational stage of cognitive development. Classification studies also indicated that simple classification abilities were present at the preoperational stage. There were no studies reviewed that specifically linked the two abilities: creativity and classification.

## Chapter 3

### DESIGN OF THE STUDY

This study compares the relationship between creativity and the ability to perform certain Piagetian classification tasks in kindergarten children. This chapter contains a description of procedures followed in selecting, securing and analyzing data. These procedures are as follows: Selection of the Problem, Selection of the Subjects, Procedure for Collecting Data, Description of the Starkweather Originality Test for Young Children, Description of the Piagetian classification tasks and Analysis of the Data.

### SELECTION OF THE PROBLEM

Mounting sociological, political and ecological problems are reasons for concern with the ability of future generations to cope and survive. Futurists stressed the point that old solutions would not suffice in the society of the future. Toynbee (1964), Torrance (1970) and Heilbroner (1974), among others, called for the development of creative minds to lead the next generation.

Piaget's theories on the cognitive development of the child indicated that cognition begins at birth and develops as the child is actively involved with his environment. Studies on creativity indicated

that creativity begins in the young child as he manipulates the environment. Educators and psychologists stressed the importance of the early years in the child's development and expressed concern for understanding the development of creativity. The purpose of this study is to determine whether there is a relationship between the development of creativity and the development of cognition, as measured by Piagetian classification tasks, in the young child.

### SELECTION OF THE SUBJECTS

The principal of Stephenson School, Bonham, Texas, was contacted in order to determine the possibility of testing children at his school. The principal was very pleased and provided a list of names of fifty children from two kindergarten classrooms. Plans were made for the testing with the principal's enthusiastic approval.

The testing procedures were discussed with the two kindergarten classroom teachers. Dates for the testing were established as every Monday and Wednesday of the first four weeks in November, 1975.

### PROCEDURE FOR COLLECTING DATA

The kindergarten classes were observed for one full morning before the testing began. The classrooms were visited in order to observe the day by day routine and to become acquainted with the

children. The children were eager to participate in the testing and as a result selection of each subject for each testing session evolved into the children volunteering.

Each subject was tested in the nurse's office which was in one wing of the building. White sheets were stretched over the walls to keep subjects from being distracted by materials stored there and each subject and the investigator sat on the floor together in the nurse's office.

The Starkweather Originality Test for Young Children (Appendix A) and Piaget's classification tasks were administered individually to each subject. The administration of the Starkweather test and the Piagetian classification tasks was counterbalanced to avoid any contamination.

The Starkweather test and the Piagetian tasks were scored and data recorded on specially prepared score sheets (Appendices B and C) as the subject responded to each part of the test. Twenty-five female children and twenty-five male children between the chronological ages of 5.0 and 6.6 were tested.

#### DESCRIPTION OF THE STARKWEATHER ORIGINALITY TEST

The Starkweather Originality Test for Young Children was designed to measure the creative potential of young children. In the test no attempt was made to differentiate between the closely related

factors of creative ability such as originality, flexibility, fluency and elaboration. It is possible that all of these factors contribute to a high score on the Starkweather test and it is also possible that strength in one factor alone may be sufficient to produce a high test score (Starkweather, 1974:1).

The validity of the Starkweather test was demonstrated by comparing the test scores of children with scores which indicated their freedom of expression. The validation of the test was done in terms of a quality that is accepted as a pervasive characteristic of the creative person which is freedom of expression. Originality test scores and freedom of expression are significantly related. A Spearman rank order correlation between the children's originality scores and their freedom scores yielded a coefficient of +0.687,  $p < .02$ . On the basis of this finding, the Starkweather test was accepted as a valid instrument.

The internal consistency of the Starkweather test was demonstrated by means of a split-half correlation (Spearman Brown formula). The responses of seventy-six children, on Form-A and Form-B of the test, were used in this analysis. The correlation coefficient for Form-A was +0.860 and for Form B was +0.806, both of which were significant beyond the .01 level. Inter-judge reliability in scoring was demonstrated in a comparison of two sets of scores. The responses of 144 children were scored jointly by two judges who

participated in the development of the test; and the same responses were scored by another person, trained in child development, but who had no instructions other than the written directions for scoring. The coefficient of correlation (Pearson product-moment) between the two sets of judges' scores was  $+0.989$ ,  $p < .01$ . In view of these findings, the directions for scoring were accepted as adequate. The use of these directions should assure reliable scoring (Starkweather, 1974:8).

The Starkweather test was developed for children ranging in age from three years, six months to six years, six months. This test was designed to be individually administered and the subject must be alone with the test administrator.

Materials used for the pretest were eight plastic foam pieces, two each of four shapes, and the box containing them. The pretest was developed to determine whether the subject had the ability and the freedom to communicate verbally enough to take the Starkweather test. The subject had to give five or more responses during the pretest in order for the testing to proceed.

The pretest box was open when the subject entered the room so that the test materials would immediately be perceived. The box lid was inverted and in easy reach of the subject. The subject was instructed to pick two identical shapes; one for the subject and one for the investigator. The subject was told to label the first shape by

its appearance. The investigator said, "What can your shape be called?" and "What does it look like?" When the subject gave a name to the first shape chosen, the investigator nodded affirmatively and repeated the label given to the shape by the subject. The subject was instructed to give a label to the second shape chosen which was being held by the investigator. Any response the subject gave was accepted, whether or not it was different from the first response. If the subject could not respond to the first shape chosen, the investigator suggested a response, "Could it be a tree?" If the subject agreed by nodding or speaking, the subject was encouraged to label the second shape. The pretest continued until the subject had responded to all eight foam shapes. When all the shapes had been named and placed in the inverted box lid, the investigator moved the shapes back into the first box verbally reviewing the subject's responses each time. One purpose of the pretest was to show the subject that both similar and different responses were acceptable. This was accomplished as the investigator reviewed the subject's responses.

The Starkweather test consisted of forty plastic foam shapes, four each of ten different shapes. The identically shaped pieces were painted in four colors: red, blue, green and yellow. The pieces were presented in two boxes, each box containing twenty pieces, two of each shape assorted in color. The boxes were designed



so that the inverted lids would serve as additional boxes during the administration of the test. The Starkweather test was administered in the same manner as the pretest. The subject's responses were scored during the test on a specially developed score sheet (Appendix B). Each subject's score was the number of different responses given with the maximum score being forty. Responses were scored in the order in which they appeared on the score sheet. Credit was given for each response that was different from all previous responses.

#### PIAGETIAN CLASSIFICATION TASKS

Piaget has not developed standardized tests for his classification tasks. The literature revealed that some educators are engaged in developing standardized tests based on Piaget's tasks.

Many studies have been published which replicate Piaget's work using his cognitive tasks. These studies were based on Piaget's clinical method which utilized the following ideas: (1) The subject is presented with a task to which he is expected to respond; (2) The subject responds through manipulation of materials presented; (3) A new stimulus situation is presented in order to clarify the subject's response.

Piaget's tasks share certain common attributes: they involve manipulation of materials on the part of the subject; the tasks are

carried out by one subject at a time; and there is a definite method of questioning of the subject.

The materials for the Piagetian classification tasks used for this study were twelve attribute shapes: six blue and six red. Six of the shapes were circles and six were squares. Six of the combination were large circles and squares, and six were small circles and squares. The materials for the class inclusion task were a box containing sixteen wooden beads: four blue beads and twelve red beads.

During the administration of the Piagetian classification tasks conditions concerning the environment were the same as for the administration of the Starkweather test. The box of geometric attribute shapes made up of circles and squares, large and small, red and blue, was opened and the contents placed on the floor. The subject was directed to look at the shapes and to separate them into two different piles, those alike in one characteristic and those alike but in a different characteristic. The subject was instructed to manipulate and use all the shapes. The subject was given three opportunities to separate and classify the shapes.

The last classification task was class inclusion. This task was concerned with the relationship of the part to the whole, of a partial class which is included in a total class. Materials that were used were a box of sixteen wooden beads, four blue beads and

twelve red beads.

The subject was directed to look at the beads, hold them and to place all of them into the box. The subject was asked whether all the beads were made of wood. The subject was directed to put all the red beads into the box lid first and then to put the blue beads into the box lid. The subject was then asked if there were more red beads or more wooden beads in the box lid.

The data were recorded on a score sheet (Appendix C) as the subject responded to the classification tasks according to the following criteria:

1. Could the subject do simple sorting, according to a single property or attribute like color, shape or size?
2. In what order did the subject do his sorting: color, shape or size first, second or third?
3. Could the subject do true classification, abstracting the common property in a group of objects and finding that object in the same group?
4. Could the subject do multiplicative classification, classifying by more than one property?
5. Could the subject do class inclusion?

## ANALYSIS OF THE DATA

The Starkweather Originality Test for Young Children was scored using the instructions included with the test. The scores for the test could range from zero to forty. On the Piagetian classification tasks the subjects could or could not complete the tasks. The categories for the tasks were color, shape, size, true classification, multiplicative classification and class inclusion. The child received either a score of one (he could perform the task) or zero (he could not perform the task).

A point-biserial correlation was computed for the paired set of variables for each subject. The variables were the scores from the Starkweather Originality Test for Young Children and the scores from the Piagetian classification tasks. A point-biserial correlation was computed to determine whether correlation existed between creativity and the ability to do Piagetian classification tasks. The .05 level of significance was used as a basis for rejecting or failing to reject the null hypotheses.

Tests for analysis of variance were used to determine differences exhibited by male and female children between the scores on the Starkweather test and the scores on the Piagetian classification tasks. A point-biserial correlation was also computed to determine whether there was a relationship between the sex of the subjects and their scores on the Starkweather test. The .05 level of

significance was used as a basis for rejecting or failing to reject the null hypothesis.

#### SUMMARY

This chapter discussed the design of the study which included the selection of subjects and the method of collecting and analyzing the data. The methods of administering the Starkweather Originality Test for Young Children and the Piagetian classification tasks were described in detail.

## Chapter 4

### ANALYSIS OF THE DATA

This study investigated the relationship between creativity and the ability to do certain Piagetian classification tasks in kindergarten children. Creativity was determined by subjects' scores on the Starkweather Originality Test for Young Children. Classification skills tested were the ability to classify according to color, shape and size, and to do true classification, multiplicative classification and class inclusion. Scores on the Starkweather test could range from zero to forty. Subjects rated on each Piagetian classification task were given a score of one if they could classify and a score of zero if they could not classify.

### FINDINGS OF THE HYPOTHESES

In order to determine the relationship between creativity and the ability to do Piagetian classification tasks a point-biserial correlation was computed and tested for significance. The .05 level of significance was used as a basis for rejecting or failing to reject the null hypotheses.

A simple one way analysis of variance was computed to determine the differences exhibited by male and female kindergarten

children between creativity and the ability to do certain Piagetian classification tasks. The .05 level of significance was used as a basis for rejecting or failing to reject the null hypotheses.

The point-biserial correlation was also used to compute the relationship between the sex of the kindergarten children and their creativity scores. The .05 level of significance was used as a basis for rejecting or failing to reject the null hypothesis.

#### Null Hypothesis One

There is no statistically significant relationship between the creativity of kindergarten children and their ability to classify according to color. Twenty-three subjects could and twenty-seven subjects could not classify according to color. Table 1 presents the data for the point-biserial statistical analysis. The mean score for the subjects who could classify according to color was 26.0869 with a standard deviation of 5.7990. Subjects who could not classify according to color have a mean score of 26.1481 and a standard deviation of 6.5085. Statistical analysis of the data indicated a point-biserial correlation of 0.0346 which was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between creativity and the ability to classify according to color in kindergarten children. Creativity scores and the Piagetian classification scores for color are presented in Table 14 in Appendix D.

Table 1

Correlation of Creativity and the Ability to  
Classify According to Color

Subjects Who Could Classify by Color		Subjects Who Could Not Classify by Color		$r_{pb}$
Mean	Standard Deviation	Mean	Standard Deviation	
26.0869	5.7990	26.1481	6.5085	0.0346*

\*Not significant at the .05 level.

#### Null Hypothesis Two

There is no statistically significant relationship between the creativity of kindergarten children and their ability to classify according to shape. Twenty-seven subjects could and twenty-three subjects could not classify according to shape. Table 2 presents the data for the point-biserial statistical analysis. The mean score for the subjects who could classify according to shape was 27.0370 with a standard deviation of 5.1997. Subjects who could not classify according to shape had a mean score of 25.0434 and a standard deviation of 5.7562. Statistical analysis of the data indicated a point-biserial correlation of 1.3984 which was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between creativity and the ability to classify



according to shape in kindergarten children. Creativity scores and the Piagetian classification scores for shape are presented in Table 15 in Appendix D.

Table 2

Correlation of Creativity and the Ability to  
Classify According to Shape

Subjects Who Could Classify by Shape		Subjects Who Could Not Classify by Shape		$r_{pb}$
Mean	Standard Deviation	Mean	Standard Deviation	
27.0370	5.1997	25.0434	5.7562	1.3984*

\*Not significant at the .05 level.

Null Hypothesis Three

There is no statistically significant relationship between the creativity of kindergarten children and their ability to classify according to size. Ten subjects could and forty subjects could not classify according to size. Table 3 presents the data for the point-biserial statistical analysis. Subjects who could classify according to size had a mean score of 29.9000 with a standard deviation of 4.0400. Subjects who could not classify according to size had a mean score of 25.1750 and a standard deviation of 6.0249. Statistical analysis of the data indicated a point-biserial correlation of

0.3202 which was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between creativity and the ability to classify according to size in kindergarten children. Creativity scores and the Piagetian classification scores for size are presented in Table 16 in Appendix D.

Table 3

Correlation of Creativity and the Ability to  
Classify According to Size

Subjects Who Could Classify by Size		Subjects Who Could Not Classify by Size		$r_{pb}$
Mean	Standard Deviation	Mean	Standard Deviation	
29.9000	4.0400	25.1750	6.0249	0.3202*

\*Not significant at the .05 level.

#### Null Hypothesis Four

There is no statistically significant relationship between the creativity of kindergarten children and their ability to do true classification. Eleven subjects could and thirty-nine subjects could not do true classification. Table 4 presents the data for the point-biserial statistical analysis. The mean score for subjects who could do true classification was 29.4545 with a standard deviation of 4.0832.

Subjects who could not do true classification had a mean score of 25.4358 and a standard deviation of 5.5997. Statistical analysis of the data indicated a point-biserial correlation of 0.3042 which is not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between creativity and the ability to do true classification tasks in kindergarten children. Creativity scores and the Piagetian true classification scores are presented in Table 17 in Appendix D.

Table 4  
Correlation of Creativity and the Ability to  
Do True Classification

Subjects Who Could Do True Classification		Subjects Who Could Not Do True Classification		$r_{pb}$
Mean	Standard Deviation	Mean	Standard Deviation	
29.4545	4.0832	25.4358	5.5997	0.3042*

\*Not significant at the .05 level.

#### Null Hypothesis Five

There is no statistically significant relationship between the creativity of kindergarten children and their ability to do multiplicative classification. Four subjects could and forty-six subjects

could not do multiplicative classification. Table 5 presents the data for the point-biserial statistical analysis. Subjects who could do multiplicative classification had a mean score of 31.5000 with a standard deviation of 6.0277. Subjects who could do multiplicative classification had a mean score of 25.8695 and a standard deviation of 5.5299. Statistical analysis of the data indicated a point-biserial correlation of 0.2702 which is not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between creativity and the ability to do multiplicative classification tasks in kindergarten children. Creativity scores and the Piagetian multiplicative classification scores are presented in Table 18 in Appendix D.

Table 5

Correlation of Creativity and the Ability to  
Do Multiplicative Classification

Subjects Who Could Do Multiplicative Classification		Subjects Who Could Not Do Multiplicative Classification		
Mean	Standard Deviation	Mean	Standard Deviation	$r_{pb}$
31.5000	6.0277	25.8695	5.5299	0.2702*

\* Not significant at the .05 level.

### Null Hypothesis Six

There is no statistically significant relationship between the creativity of kindergarten children and their ability to do class inclusion. Three subjects could and forty-seven subjects could not do class inclusion. Table 6 presents the data for the point-biserial statistical analysis. The mean score for subjects who could do class inclusion was 24.6666 with a standard deviation of 2.9154. Subjects who could not do class inclusion had a mean score of 26.8085 and a standard deviation of 4.9283. Statistical analysis of the data indicated a point-biserial correlation of 0.1751 which was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between creativity and the ability to do class inclusion classification tasks in kindergarten children. Creativity scores and the Piagetian class inclusion scores are presented in Table 19 in Appendix D.

### Null Hypothesis Seven

There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to color. Ten male subjects could and fifteen male subjects could not classify according to color. Thirteen female subjects could and twelve females could not classify according to color. An analysis of variance was computed to determine the

statistical relationship between the sex of the subjects and their creativity and ability to classify according to color. An  $f$  ratio of 0.1768 was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. Table 7 presents the data for the statistical treatment. The analysis of variance did not indicate a significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to color.

Table 6

Correlation of Creativity and the Ability to  
Do Class Inclusion

Subjects Who Could Do Class Inclusion		Subjects Who Could Not Do Class Inclusion		$r_{pb}$
Mean	Standard Deviation	Mean	Standard Deviation	
24.6666	2.9154	26.8085	4.9283	0.1751*

\*Not significant at the .05 level.

Null Hypothesis Eight

There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to shape. Fifteen male subjects could and ten male subjects could not classify according to shape. Twelve

Table 7

Comparison of Creativity and the Ability to Classify  
According to Color in Male and Female Subjects

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	Residuals	
				F Ratio	Probability
Within Groups	46	1,820.2969	39.5717		
Between	3	20.9844	6.9948	0.1768*	0.9116
Total	49	1,841.2813			

\*Not significant at the .05 level.

female subjects could and thirteen female subjects could not classify according to shape. An analysis of variance was computed to determine the statistical relationship between the sex of the subjects and their creativity and ability to classify according to shape. An  $f$  ratio of 0.4442 was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. Table 8 presents the data for the statistical treatment. The analysis of variance did not indicate a significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to shape.

#### Null Hypothesis Nine

There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to classify according to size. Four males could and twenty-one males could not classify according to size. Six females could and nineteen females could not classify according to size. An analysis of variance was computed to determine the statistical relationship between the sex of the subjects and their creativity and ability to classify according to size. An  $f$  ratio of 2.4897 was not significant at the .05 level of confidence; therefore the null hypothesis was not rejected. Table 9 presents the data for the statistical treatment. The analysis of variance did not indicate a significant difference exhibited by male and female kindergarten children between



Table 8

Comparison of Creativity and the Ability to Classify  
According to Shape in Male and Female Subjects

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	Residuals	
				F Ratio	Probability
Within Groups	47	1,791.7148	38.1216		
Between	3	50.7969	16.9323	0.4442*	0.7226
Total	50	1,842.5117			

\*Not significant at the .05 level.

Table 9

Comparison of Creativity and the Ability to Classify  
According to Size in Male and Female Subjects

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	Residuals	
				F Ratio	Probability
Within Groups	46	1,584.0742	34.4364		
Difference	3	257.2070	85.7357	2.4897*	0.0721
Total	49	1,841.2813			

\*Not significant at the .05 level.

creativity and the ability to classify according to size.

#### Null Hypothesis Ten

There is no statistically significant difference exhibited by male and female kindergarten children between creativity and the ability to do true classification. Six males could and nineteen males could not do true classification. Five females could and twenty females could not do true classification. An analysis of variance was computed to determine the statistical relationship between the sex of the subjects and their creativity and ability to do true classification. An  $f$  ratio of 1.6681 was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. Table 10 presents the data for the statistical treatment. The analysis of variance did not indicate a significant difference exhibited by male and female kindergarten children between creativity and the ability to do true classification.

#### Null Hypothesis Eleven

There is no significant difference exhibited by male and female kindergarten children between creativity and the ability to do multiplicative classification. Four males could and twenty-one males could not do multiplicative classification. None of the twenty-five females could do multiplicative classification. An analysis of variance was computed to determine the statistical relationship between

Table 10

Comparison of Creativity and the Ability to Do True  
Classification in Male and Female Subjects

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	Residuals	
				F Ratio	Probability
Within Groups	46	1,408.0391	30.609		
Difference	3	153.1836	51.0612	1.6681	0.1869
Total	49	1,561.2227			

\*Not significant at the .05 level.

the sex of the subjects and their creativity and ability to do multiplicative classification. An  $f$  ratio of 1.9237 was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. Table 11 presents the data for the statistical treatment. The analysis of variance did not indicate a significant difference exhibited by male and female kindergarten children between creativity and the ability to do multiplicative classification.

#### Null Hypothesis Twelve

There is no significant difference exhibited by male and female kindergarten children between creativity and the ability to do class inclusion. Three males could and twenty-two males could not do class inclusion. None of the twenty-five female subjects could do class inclusion. An analysis of variance was computed to determine the statistical relationship between the sex of the subjects and their creativity and ability to do class inclusion. An  $f$  ratio of 0.2829 was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. Table 12 presents the data for the statistical treatment. The analysis of variance did not indicate a significant difference exhibited by male and female kindergarten children between creativity and the ability to do class inclusion.

Table 11

Comparison of Creativity and the Ability to Do Multiplicative  
Classification in Male and Female Subjects

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	Residuals	
				F Ratio	Probability
Within Groups	47	1,443.0898	30.7040		
Difference	2	118.1328	59.0664	1.9237*	0.1574
Total	49	1,561.2227			

\*Not significant at the .05 level.

Table 12

Comparison of Creativity and the Ability to Do  
Class Inclusion in Male and Female Subjects

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	Residuals	
				F Ratio	Probability
Within Groups	47	1,819.3828	38.7103		
Difference	2	21.8984	10.9492	0.2829*	0.7549
Total	49	1,841.2813			

\*Not significant at the .05 level.

### Null Hypothesis Thirteen

There is no significant relationship between the sex of the kindergarten children and their creativity scores. Table 13 presents the data for the point-biserial analysis. The mean score for the male subjects was 26.5600 with a standard deviation of 5.8847. The female subjects had a mean score of 25.6800 and a standard deviation of 7.3013. Statistical analysis of the data indicated a point-biserial correlation of 0.4686 which was not significant at the .05 level of confidence; therefore, the null hypothesis was not rejected. The point-biserial correlation did not indicate a significant relationship between the sex of the kindergarten children and their creativity scores. Creativity scores and the sex of the kindergarten children are listed in Table 20 in Appendix D.

Table 13

Correlation of Creativity Scores and  
the Sex of the Subjects

Creativity Scores of Male Subjects		Creativity Scores of Female Subjects		$r_{pb}$
Mean	Standard Deviation	Mean	Standard Deviation	
26.5600	5.8847	25.6800	7.3013	0.4686*

\*Not significant at the .05 level.



## STATISTICAL REVIEW

A review of interpretation of the data from this study indicated that there was not a significant relationship between creativity and the ability to classify. No significant differences were exhibited by male and female subjects in the relationship between creativity and the ability to classify. The data also indicated there was no significant relationship between the sex of the subjects and their creativity scores.

## Chapter 5

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The decade of the 1960's brought about a renaissance of interest in early childhood education which resulted in a comprehensive analysis of the young child and all aspects of its development. Piaget's work on the development of cognition in children was reported and replicated, but few studies on the development of creativity in the young child were undertaken. Educational prophets predicted doom for civilization if creative solutions were not developed for sociological, political and ecological problems. Pertinent issues in early childhood education in the 1970's were the development of creativity in children and also the emphasis upon the development of cognitive abilities.

### SUMMARY

The purpose of this study was to determine whether there is a relationship between creativity and the cognitive abilities of children as based on Piaget's studies. The cognitive ability selected was classification as measured by Piaget's classification tasks.

The review of literature revealed the existence of a scarcity of

research on the relationship between creativity and the ability to classify. Studies on creativity and Piaget's classification theories were surveyed in order to detect any known relationship. Creativity studies indicated that creativity develops in the young child as he manipulates objects in his environment. Piaget's longitudinal studies on children indicated that classification abilities begin in the preoperational period of the child's development between the ages of two and seven as the child explores and manipulates objects in his environment.

Fifty kindergarten children at Stephenson School, Bonham, Texas, were administered the Starkweather Originality Test for Young Children to determine their creativity. The responses of subjects were recorded during the administration of the test on a special score sheet (Appendix B). Possible scores for the test ranged from forty to zero. Piaget's classification tasks were also administered using Piaget's clinical method of observation and testing. The subjects could either perform the task and receive a score of one, or they could not perform the task and receive a score of zero. The subjects were observed to determine whether they could classify according to color, shape or size, and whether they could do true classification, multiplicative classification and class inclusion.

A point-biserial correlation was used to determine whether there was any significant relationship between creativity and the

ability to classify according to color, shape or size, and to do true classification, multiplicative classification and class inclusion. The findings of this statistical analysis indicate there were no significant relationships between the following:

1. Creativity and the ability to classify by color
2. Creativity and the ability to classify by shape
3. Creativity and the ability to classify by size
4. Creativity and the ability to do true classification
5. Creativity and the ability to do multiplicative classification
6. Creativity and the ability to do class inclusion.

Tests for analysis of variance were developed to determine differences exhibited by male and female subjects between the scores on the Starkweather test and the scores on the Piagetian classification tasks. Findings from this statistical treatment indicated that there were no significant differences exhibited by male and female subjects between the scores on the Starkweather test and the scores on the Piagetian classification tasks.

A point-biserial correlation was also computed to determine whether there was a relationship between the sex of the subjects and their scores on the Starkweather test. The findings from this statistical analysis determined there was no significant relationship between the sex of the subjects and their scores on the Starkweather test. The .05 level of significance was chosen for the level of rejection

of the null hypotheses.

## CONCLUSIONS

The conclusions of this study are limited to the kindergarten population at Stephenson School, Bonham, Texas. Based on the findings produced by the study, the following was concluded:

1. There was no significant relationship between creativity and the ability to do certain Piagetian classification tasks in kindergarten children in this study. A review of the literature indicated that creativity develops as the young child explores and manipulates objects in the environment. Piaget stated that simple classification begins in the preoperational period of development and is based on the motor activities of the child. During the preoperational period of development, between the ages of two and seven, the child can sort elements of a class according to a major attribute. Creativity and classification abilities both begin in the young child, but conclusions drawn from this study are that creativity and the ability to classify are not significantly related. Therefore, creativity was not a determining variable in the development of the ability to classify, and classification abilities were not important to the development of creativity in the kindergarten child.

2. There was no significant relationship between creativity and the ability to classify by color in kindergarten children in this

study. Twenty-three of the fifty subjects tested could classify by color, including ten males and thirteen females. Conclusions from this study indicate creativity was not a determining variable in the development of the ability to classify by color, and the ability to classify by color was not important in the development of creativity. This study supports Piaget's theory that classifying by a single attribute is one of the first steps in classification.

3. There was no significant relationship between creativity and the ability to classify by shape in kindergarten children in this study. Twenty-seven of the fifty subjects could classify by shape, including fifteen males and twelve females. Conclusions from this study indicate creativity was not a determining variable in the development of the ability to classify by shape, and that the ability to classify by shape was not important in the development of creativity in kindergarten children. More subjects in this study classified by shape than by any other attribute. Conclusions from this data are that classification by shape was developed before classification by color or size.

4. There was no significant relationship between creativity and the ability to classify by size in kindergarten children in this study. Ten of fifty subjects could classify by size, including four males and six females. Conclusions from this study are that creativity was not a determining variable in the development of the ability to classify by

size and that the ability to classify by size was not important in the development of creativity in kindergarten children. Fewer subjects were able to classify by size than color or shape. Conclusions from these data indicate classification by size was an ability that is more advanced in the classification hierarchy than classification by color or shape.

5. There was no significant relationship between creativity and the ability to do true classification in kindergarten children in this study. Eleven of fifty subjects could do true classification, including six males and five females. Conclusions from this study are that creativity was not a determining variable in the ability to do true classification, and that the ability to do true classification was not important in the development of creativity. Piaget stated that true classification is evident in the concrete operational period of development between the ages of seven and twelve. Eleven of the subjects had advanced to the concrete operational period of development in their classification abilities. This study substantiates Piaget's theory that true classification is more advanced in the classification hierarchy than simple sorting. Fewer subjects could do true classification than classification by color or shape. However, more subjects could do true classification than could classify by size. This indicates that classification by size might be a skill that is more advanced in the classification hierarchy.

6. There was no significant relationship between creativity and multiplicative classification in kindergarten children in this study. Four of fifty subjects could do multiplicative classification, including four males and no females. Conclusions from this study are that creativity was not a determining variable in the ability to do multiplicative classification, and that the ability to do multiplicative classification was not important in the development of creativity. Multiplicative classification is a higher level of classification than simple sorting by color, shape or size, and true classification. Fewer subjects were able to do multiplicative classification than classification by color, shape or size, and true classification. Piaget described multiplicative classification as an ability that is evident in the concrete operational period of cognitive development. Four male subjects could do multiplicative classification and were, therefore, in the concrete operational period of development in their classification abilities.

7. There was no significant relationship between creativity and the ability to do class inclusion in kindergarten children. Three males of the fifty subjects could do class inclusion, which is the highest form of classification. Conclusions from this study are that creativity was not a determining variable in the development of class inclusion abilities, and class inclusion abilities were not important in the development of creativity. Three male subjects were able to



perform the highest form of classification, and, therefore, were in the concrete operational period of development in their classification abilities, such as simple sorting by color, shape or size, true classification and multiplicative classification.

8. There were no significant differences exhibited between male and female children in the relationship between creativity and the ability to perform certain Piagetian classification tasks. The number of males and females who were able to perform in each classification category in this study are as follows:

	<u>Males</u>	<u>Females</u>
Classify by color	10	13
Classify by shape	15	12
Classify by size	4	6
True classification	6	5
Multiplicative classification	4	0
Class Inclusion	3	0

Although only males could do multiplicative classification and class inclusion, a statistical analysis indicated that the number was not significant enough to make any conclusions. Therefore, it is concluded that sex was not a determining variable in any relationship between creativity and the ability to classify.

9. There was no significant relationship between the sex of the kindergarten children and their scores on the creativity test.

In this study the sex of the kindergarten child was not a determining variable in the development of creativity. Therefore, it is concluded that sex is not a determining variable in the development of creativity.

### RECOMMENDATIONS

On the basis of the limitations and design of this study, as well as the conclusions, the following recommendations for additional research are made:

1. The standardization of Piaget's classification tasks would add strength to future studies concerning classification abilities.
2. Studies should be designed based on this investigation using different standardized creativity tests.
3. A replication of this study should be developed using two kindergarten groups: one kindergarten group based on an academically oriented curriculum and the other on an affectively oriented curriculum.
4. A longitudinal study should be designed which would compare creativity and the ability to do certain Piagetian classification tasks in children at the age of seven and again at the age of twelve. Piaget stated that children at the age of seven begin the concrete operational period of cognitive development, and children at the age of twelve begin the formal operational period of cognitive development.

5. Studies should be designed which would replicate this investigation using different samples such as a comparison of kindergarten children in an urban school with kindergarten children in a rural school.

6. A study should be developed which would further investigate the hierarchy of classification skills in young children.

7. This study should be replicated using experimental classroom procedures designed to stimulate creativity.

8. Experimental classroom procedures designed to emphasize classification skills should be developed in another replication of this study.

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APPENDIX A  
STARKWEATHER ORIGINALITY TEST  
FOR YOUNG CHILDREN

## STARKWEATHER ORIGINALITY TEST

## FOR YOUNG CHILDREN\*

developed by  
Elizabeth K. Starkweather

Oklahoma State University  
Stillwater, Oklahoma

The Starkweather Originality Test is designed to measure the creative potential of young children. In the test, no attempt is made to differentiate the closely related factors of creative ability which have been identified in older children and adults, such as originality, flexibility, fluency, and elaboration. It is possible that all of these factors contribute to a high score on the Originality Test, and it is also possible that strength in one factor alone may be sufficient to produce a high test score.

Recommended Age Range

The Starkweather Originality Test is designed for use with children ranging in age from 3 years 6 months to 6 years 6 months.

Children younger than 3 years 6 months can be given the Originality Test if their ability to communicate verbally is satisfactorily demonstrated during the pretest.

Children older than 6 years 6 months tend to earn higher test scores than do younger children, and as a result, their median score is apt to be near the ceiling of the test. Under such circumstances, the less original children are identified but the more original children are not.

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\*The Starkweather Originality Test was developed as part of a creativity research program supported by the Research Foundation at Oklahoma State University.

### Testing Situation

The Starkweather Originality Test is individually administered. The child being tested must be alone with the adult administering the test. Both may sit at a table or on the floor. The important consideration is that the child be comfortable and happy. In this one-to-one relationship, the child can know and must know that his responses are all accepted and enjoyed. Neither the child nor the adult must feel hurried.

(The major difference between intelligence testing and creativity testing is in the type of response expected from the child. In the former, a specific correct response is required; whereas in the latter, there is no correct response and virtually any response made by the child is acceptable.)

The table or the floor area used for testing must be large enough for both the child and the adult to have an open box of test materials and the inverted box lid within easy reach.

### The Pretest

The pretest materials consist of eight plastic foam pieces, two each of four shapes. One of each shape is white and the other is pastel. The pieces are in a special box designed for use in the test.

The purpose of the pretest is to determine whether the child has the ability and the freedom to communicate verbally to the extent necessary for taking the Originality Test. The child must give five or more different responses during the pretest. If he does not, the testing does not proceed.

The pretest also serves to show the child that different responses are acceptable and similar responses are acceptable. For example, for two pieces of the same shape, the child may give a different response for each or he may give the same response for each. This must be demonstrated for every child before the Originality Test is administered.

Administration: The pretest box should be open when the child enters the room in order that he immediately see the materials with which he will be playing. The box lid, inverted, should be within easy reach. It serves as a second box into which the child places the pieces as he finishes with them.



The adult (E.) tells the child to take one piece, any one that he wants. When he has done so, E. tells him to find another piece like it. Then E. asks to hold one of the pieces.

"You take one. Any one you want."

"All right. Now find another one like it."

"Let me hold one." (Many children give the white pieces to the adult and hold the colored pieces themselves.)

E. asks the child what his piece could be and offers encouragement if he is hesitant. (The child must not be hurried. He must be given plenty of time to respond.)

"What can yours be?"

"What does it look like?"

"What would you like it to be?"

"Just pretend."

"What do you want it to be?"

(These are examples of the kinds of comments that can be made in encouraging the child to respond.)

When the child has named his piece, E. asks what the other piece might be. (Throughout the pretest and test proper, as each pair of pieces is presented, E. holds her piece in the same position that the child holds his, and she changes the position of her piece after the child has given one response.)

"All right. Yours is a (tree)." (E. changes the position of the piece she is holding.)

"What can mine be?"

Any answer the child gives is accepted, whether it is different from his first response or the same. Both pieces are then put into the inverted box lid. E. puts hers in, making a comment such as "In they go!" The child usually follows spontaneously with his. If necessary E. puts both pieces into the box top.

If the child does not pick up a piece, E. picks up the rectangular piece and asks what it could be. If the child does not respond, E. suggests an answer.

"What could this be?"

"What does it look like?"

"Could it be a window?"

"All right. It's a good window. Now what can mine be?"

Children who do not pick up the first piece and those who do not respond to the first piece are frequently unable to proceed with the test; that is, they do not pass the pretest and the test proper is not administered. Rarely does a child under three years of age pass the pretest.

The pretest continues as above until the child has responded to all eight pieces. (For easy recall, the child's responses should be recorded on the back of the score sheet.) When all the pieces have been named and placed in the inverted box lid, E. moves the pieces one at a time back to the first box, reviewing the child's responses as she does so.

One purpose of the pretest is to show the child that different responses and similar responses are acceptable. This is accomplished as E. reviews the child's responses. Some children give a different response for each piece during the pretest; some children give different responses for some paired pieces and the same response for other paired pieces; and some children give the same response for all paired pieces. Below are examples of the ways of reviewing the child's responses.

Example 1: The child gave a different response for each piece during the pretest.

Slide . . . . . Car  
 Window . . . . . Swimming pool  
 Tree . . . . . Ice cream cone  
 Bed . . . . . "I"

For this child, E. must demonstrate that it is all right to give the same response for two pieces of the same shape, and she must do so without rejecting any of the child's responses. She does this by suggesting that the same response for the last paired pieces would be acceptable, as follows:

"This is a slide . . . and this is a car."  
 "This is a window . . . and this is a swimming pool."  
 "This is a tree . . . and this is an ice cream cone."  
 "This is a bed . . . and this is an 'I' -- or it could be another bed, and then we'd have two beds!"

Example 2: The child gave some different responses and some similar responses during the pretest.

Slide . . . . . Car  
 Window . . . . . Window  
 Tree . . . . . Tree  
 "H" . . . . . "I"

For this child, E. is accepting similar and different responses as she moves the pieces and reviews the child's responses.

"This is a slide . . . . . and this is a car."  
 "This is a window . . . . . and this is a window."  
 "This is a tree . . . . . and this is a tree."  
 "This is an 'H' . . . . . and this is an 'I'."

Example 3: The child gave the same response for the two pieces in each pair. This child must be encouraged to give another response or he will have failed the pretest.

Car . . . . . Car  
 Window . . . . . Window  
 Tree . . . . . Tree  
 Bed . . . . . Bed

After the child's last response, E. continues to hold her piece and says, "Yes, it could be a bed, but we already have one bed. Could it be something else?" (E. encourages the child to give an additional response.) "Can you think of something else it could be?" "What else does it look like?"

If the child gives another response, E. reviews his responses, and the test proceeds.

If the child does not give another response, E. accepts his first response and the test does not proceed.

"All right. We have two beds!"

### The Originality Test

The Originality Test consists of 40 plastic foam pieces, four each of ten different shapes. The identically shaped pieces are painted in four colors--red, blue, green, and yellow. The pieces are presented

in two boxes, each box containing 20 pieces, two of each shape assorted in color. As for the pretest, the boxes are designed so that the inverted lids serve as additional boxes during the administration of the test.

Administration: In the administration of the test proper, the two boxes of 20 pieces each are used simultaneously. E. inverts one box and places it before the child; and the other box, also inverted, she places before herself. E. then opens her box by lifting the upper part, thus revealing the pile of colored pieces in the inverted box lid. The child does the same with his box. The empty boxes are placed within easy reach; and as the test proceeds, the pieces are transferred one by one from the inverted lids to these boxes.

E. tells the child to take one piece, and then she finds a piece of the same shape in her box.

"You take a piece. Any one that you want."

"All right. Now I will find one like it in my box."

E. holds her piece in the same position that the child holds his. She then comments about the colors and asks what the child's piece might be.

"You have a (red) one and I have a (yellow) one."

"What could yours be?"

When the child responds, E. accepts his response, changes the position of her piece, and asks what hers might be.

"OK. Yours is a (bridge). What can mine be?"

When the child has again responded, E. directs him to put his piece in his empty box, and she puts her piece in her box. This procedure is repeated until the child has responded to all 40 pieces, 20 from his box and 20 from E's box.

During the administration of the test proper, the child's responses are accepted whether or not he gives different responses for the various shapes. Unlike the pretest, the child is not encouraged to give different responses to pieces which are of the same shape.

Occasionally a child will take two or more pieces and construct something with them as he talks. When this happens, he should be

encouraged to respond to each piece separately. For example, E. might say, "All right; but what could this piece be all by itself?"

Scoring: The Originality Test provides four opportunities for the child to respond to each shape, making a total of 40 responses. Each child's score is the number of different responses he gives, with the maximum possible score being 40. Responses are scored in the order in which they appear on the score sheet, i.e., the four responses for the first shape, then the four responses for the second shape, etc.

Credit is given for each response that is different from all previous responses. Credit is given for the names of categories and for objects which are in the same category, such as a golf ball and a baseball. Credit is not given for objects which are named a second time and altered by a minor adjective, such as a ball and a little ball. Credit is not given for invented words or a play on words, such as kigless and sigless. Credit is given for "pet" words which have special meaning for the child, and care must be taken to distinguish between these and nonsense words invented by the child during the test. (Detailed scoring directions and sample score sheets are appended.)

### Evaluation of the Originality Test

Comparison of Form-A and Form-B: Two forms of the Originality Test (Form-A and Form-B) have been developed, and the comparability of the two forms has been demonstrated in test-retest research with 76 children. For half of these children, Form-A was administered first, and for the other half, Form-B was first. The children in the two groups were matched on initial test scores in order that the comparability of the two forms of the test not be distorted by differences that might exist among the children. The test-retest research included statistical analyses of the following data: retest scores, changes in scores from test to retest, and responses given to individual test items.

If the two forms of the Originality Test are comparable, the children in the two groups should have similar retest scores. Statistical analysis indicated that there was no significant difference between the retest scores of the two groups ( $T = 0.035$ , n.s.); and there was no significant difference between the test and retest scores of the children in either group (A-B test sequence:  $t = 0.105$ , n.s.; B-A test sequence:  $t = 0.010$ , n.s.).

If the two forms of the Originality Test are comparable, changes in the test-retest scores of individual children in the two groups should be similar. For a majority of the children, test and retest scores were identical or differed by more than three points; and for only eleven of the children were the score changes in excess of six points. A Chi-square analysis indicated that there was no significant difference in the changes in scores from test to retest for the two groups of children, those for whom the test sequence was A-B, and those for whom the sequence was B-A. (Chi-square = 3.46, df2, n.s.).

If the two forms of the Originality Test are comparable, the number of different responses given by the 76 children to the items in Form-A should be similar to the number given to the items in Form-B. An item analysis, based on the number of different responses given by each child, showed this to be true. The total number of different responses to the ten Form-A items was 1777, and to the ten Form-B items was 1783. The number of different responses given to the individual test items ranged from 166 to 189 for Form-A and from 164 to 192 for Form-B. A Mann-Whitney U test indicated that there was no significant difference between the number of responses to the individual Form-A items and the individual Form-B items. (U = 40.5; z = 0.189; n.s.).

Validity: The validity of the Starkweather Originality Test was demonstrated by comparing the test scores of 13 children with scores which indicated their freedom of expression, i.e., the freedom with which they expressed themselves in exploring and manipulating objects in their environment. Inasmuch as the Originality Test was designed to measure creative potential and was not presumed to measure specific aspects of creative ability, such as those identified in creative adults, the validation of the test was done in terms of a quality that is accepted as a pervasive characteristic of the creative person--freedom of expression.

The experimental situation designed for the measurement of freedom of expression was one in which each child played by himself with a series of simple toys while being observed through a one-way mirror. The toys were ones which could be put to a number of uses and were toys with which the children had had little or no previous experience. Each child's freedom of expression was indicated by the variety of ways in which he played with the toys. His play behavior was scored in terms of the sensory experiences he used in exploring and manipulating the toys, the games he invented, the constructions he made, and the freedom with which he combined the toys in play.

Originality Test scores and freedom of expression are significantly related. A Spearman rank order correlation between the children's originality scores and their freedom scores yielded a coefficient of +0.687,  $p < .02$ . On the basis of this finding, the Starkweather Originality Test was accepted as a valid instrument.

Earlier in the development of the Originality Test, teachers' judgments of children's originality were used as a crude measure of concurrent validity. In a paired-comparison design, each child who scored high on the Originality Test was paired with each child who scored low, and the teachers were asked to indicate the child who was the more original in each pair. Teachers' judgments were in the direction of the originality scores in 106 pairs out of a total of 153. A Chi-square analysis indicated this extent of agreement to be statistically significant. (Chi-square = 22.752;  $p < .001$ ).

Reliability: The internal consistency of the Originality Test was demonstrated by means of a split-half correlation (Spearman-Brown formula). The responses of 76 children, on Form-A and Form-B of the test, were used in this analysis. The correlation coefficient for Form-A was +0.860 and for Form-B was +0.806, both of which were significant beyond the .01 level.

Inter-judge reliability in scoring was demonstrated in a comparison of two sets of scores. (1) The responses of 144 children were scored jointly by two judges who participated in the development of the test; and (2) the same responses were scored by another person, trained in child development, but who had no experience with the test and who had no instructions other than the written directions for scoring. The coefficient of correlation (Pearson product-moment) between the two sets of judges' scores was +0.989,  $p < .01$ . In view of these findings, the directions for scoring were accepted as adequate. The use of these directions should assure reliable scoring.

Verbal Ability: The Originality Test requires verbal responses; nevertheless, the originality scores are independent of verbal ability. This has been demonstrated in two separate studies by a correlation of Peabody Picture Vocabulary scores (verbal ability) and Originality Test scores. In a study of 13 children, in which only Form-A of the Originality Test was administered, the product-moment correlation coefficient for these two sets of scores was +0.073, n.s. In another study of 18 children, in which both

forms of the Originality Test were administered, the correlation coefficients were +0.192 for Form-A and +0.162 for Form-B, neither of which was statistically significant.

Starkweather Originality Test  
Revised manuscript: November, 1974



## STARKWEATHER ORIGINALITY TEST FOR YOUNG CHILDREN

### DIRECTIONS FOR SCORING

In the Starkweather Originality Test, four opportunities are provided for the child to respond to each of ten different shapes, making a total of 40 responses. Each child's score is the actual number of different responses he gives during the test, with the maximum possible score being 40. Responses are scored in the order in which they appear on the score sheet, i.e., the four responses to the first shape, then the four responses to the second shape, etc.

Mark each response either plus (+) for credit, or minus (-) for no credit. Give credit for each response that is different from all previous responses on the score sheet. When in doubt, give the child credit.

### Categories of Objects

1. Credit is given for the name of a category and for each different object in the category.
  - a. Golf ball (+), Baseball (+), Moth ball (+), Golf ball (-).
  - b. Ball (+), Rubber ball (+), Baseball (+), Ball (-).
  - c. Play boat (+), Boat (+), Sail boat (+), Play boat (-).
  - d. Nine (+), Six (+), A number (+), Six (-).
  
2. No credit is given for the name of an object that is altered by a minor adjective.
  - a. Ball (+), Big ball (-), Half ball (-), Ball (-).
  - b. Dress (+), Part of a dress (-), Part of a dress (-), Dress (-).
  - c. Egg (+), Round egg (-), Little egg (-), Egg (-).
  - d. Red ball (+), Green ball (-), Yellow ball (-), Blue ball (-).

### Pet Names and Invented Words

1. Credit is given when a child responds with an invented word or pet name that has special meaning for him. For example, a child held Item-1, Form-A, and said "This is a do-dad. My grandma says so. And yours is a do-dad too."

Do-dad (+), Do-dad (-), Another do-dad (-), Another do-dad (-).

2. No credit is given for invented words that have no apparent meaning for the child. For example, no credit is given for a play on words such as the following:

Kigless (-), Pigless (-), Sigless (-), Migless (-).

#### Objects in the Testing Room

Some children look about the room for ideas. This should be noted on the score sheet in order that anyone reviewing the scoring might be aware of what had happened. ONLY under these circumstances is a subjective judgment of the child's responses permitted in the scoring of the Originality Test.

1. Credit is given if there is a possible relationship between the child's response and the test item that he is holding. For example, one child looked about the room while holding the small ball (Item-9, Form-B). He looked directly at objects in the room as he gave his responses. Credit was given as follows:

Door knob (+), Light bulb (+), Book (-), Light bulb (-).

2. No credit is given when there is no apparent relationship between the child's response and the test item that he is holding. For example, one child looked about the room and named whatever he saw without referring to the object in his hand. No credit was given for his responses.

Curtains (-), Floor (-), Paper (-), Wall (-).

APPENDIX B

STARKWEATHER ORIGINALITY TEST  
FOR PRESCHOOL CHILDREN

STARKWEATHER ORIGINALITY TEST







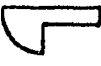



FORM - A

FOR PRESCHOOL CHILDREN

FORM - A

Name Lucy King Sex F Number 001  
 Date 7-17-74 Birthdate 4-29-69 Age 5:3  
 Testing Place Kiddie Klub

Score <b>26</b>
--------------------

1. 	Table +	Table -	Party table +	Pickup Truck +
2. 	"0" +	"0" -	Can end +	Telescope +
3. 	Block +	Box +	Block -	Box -
4. 	"E" +	"9" +	"6" +	"9" -
5. 	Teeter-Totter +	Play Boat +	Car +	Car -
6. 	Cave +	Cave -	Cave -	Cave -
7. 	"L" +	"R" +	"L" made out of cotton +	"R" -
8. 	Stick +	Part of a Gate +	Ironing board +	Stick -
9. 	Part of a Rainbow +	eye +	Part of a dress +	Boat +
10. 	"Can't think of anything" -	"Can't think of anything" -	Dress -	Thing you see how much you weigh. +

APPENDIX C  
SCORE SHEET FOR CLASSIFICATION TASKS



APPENDIX D  
CREATIVITY AND COLOR CLASSIFICATION SCORES

Table 14

## Creativity and Color Classification Scores

Subject	Sex	Creativity Scores	Color Scores	Subject	Sex	Creativity Score	Color Score
1	F	35	0	26	F	13	0
2	M	34	0	27	F	9	1
3	F	32	1	28	F	8	0
4	M	32	1	29	F	37	1
5	M	30	1	30	M	37	0
6	F	30	1	31	F	33	0
7	M	29	1	32	M	33	0
8	M	28	0	33	M	32	1
9	M	28	0	34	F	32	0
10	F	27	1	35	F	31	0
11	F	27	1	36	F	30	1
12	F	27	0	37	F	29	0
13	F	27	1	38	F	29	0
14	M	25	1	39	M	29	0
15	F	25	1	40	M	27	0
16	F	25	1	41	M	27	1
17	M	25	0	42	M	26	0
18	M	25	0	43	F	26	1
19	M	24	1	44	M	24	0
20	F	23	0	45	F	24	1
21	M	23	1	46	M	24	0
22	M	22	1	47	F	23	0
23	F	21	1	48	M	23	0
24	M	21	0	49	M	20	0
25	M	16	1	50	F	19	0



Table 15

## Creativity and Shape Classification Scores

Subject	Sex	Creativity Scores	Shape Scores	Subject	Sex	Creativity Scores	Shape Scores
1	F	35	1	26	F	13	0
2	M	34	1	27	F	9	0
3	F	32	0	28	F	8	1
4	M	32	0	29	F	37	1
5	M	30	1	30	M	37	1
6	F	30	0	31	F	33	1
7	M	29	0	32	M	33	1
8	M	28	0	33	M	32	1
9	M	28	1	34	F	32	1
10	F	27	0	35	F	31	0
11	F	27	0	36	F	30	0
12	F	27	1	37	F	29	1
13	F	27	0	38	F	29	1
14	M	25	1	39	M	29	1
15	F	25	0	40	M	27	0
16	F	25	0	41	M	27	0
17	M	25	1	42	M	26	1
18	M	25	0	43	F	26	1
19	M	24	0	44	M	24	1
20	F	23	1	45	F	24	0
21	M	23	1	46	M	24	1
22	M	22	0	47	F	23	0
23	F	21	1	48	M	23	0
24	M	21	1	49	M	20	1
25	M	16	0	50	F	19	1

Table 16

## Creativity and Size Classification Scores

Subject	Sex	Creativity Scores	Size Scores	Subject	Sex	Creativity Scores	Size Scores
1	F	35	1	26	F	13	0
2	M	34	1	27	F	9	0
3	F	32	0	28	F	8	0
4	M	32	0	29	F	37	1
5	M	30	0	30	M	37	0
6	F	30	0	31	F	33	0
7	M	29	0	32	M	33	0
8	M	28	0	33	M	32	1
9	M	28	0	34	F	32	1
10	F	27	0	35	F	31	1
11	F	27	0	36	F	30	0
12	F	27	0	37	F	29	1
13	F	27	0	38	F	29	0
14	M	25	0	39	M	29	0
15	F	25	0	40	M	29	0
16	F	25	0	41	M	27	0
17	M	25	0	42	M	26	0
18	M	25	0	43	F	26	0
19	M	24	0	44	M	24	0
20	F	23	0	45	F	24	0
21	M	23	1	46	M	24	0
22	M	22	0	47	F	23	1
23	F	21	0	48	M	23	1
24	M	21	0	49	M	20	0
25	M	16	0	50	F	19	0

Table 17

## Creativity and True Classification Scores

Subject	Sex	Creativity Scores	True Classification	Subject	Sex	Creativity Scores	True Classification
1	F	35	1	26	F	13	0
2	M	34	1	27	F	9	0
3	F	32	0	28	F	8	0
4	M	32	0	29	F	37	1
5	M	30	1	30	M	37	0
6	F	30	0	31	F	33	0
7	M	29	0	32	M	33	0
8	M	28	0	33	M	32	1
9	M	28	0	34	F	32	1
10	F	27	0	35	F	31	0
11	F	27	0	36	F	30	0
12	F	27	0	37	F	29	1
13	F	27	0	38	F	29	0
14	M	25	1	39	M	29	0
15	F	25	0	40	M	27	0
16	F	25	0	41	M	27	0
17	M	25	0	42	M	26	1
18	M	25	0	43	F	26	0
19	M	24	0	44	M	24	0
20	F	23	1	45	F	24	0
21	M	23	0	46	M	24	0
22	M	22	0	47	F	23	0
23	F	21	0	48	M	23	0
24	M	21	1	49	M	20	0
25	M	16	0	50	F	19	0

Table 18

## Creativity and Multiplicative Classification Scores

Subject	Sex	Creativity Scores	Multiplicative Classification	Subject	Sex	Creativity Scores	Multiplicative Classification
1	F	35	0	26	F	13	0
2	M	34	1	27	F	9	0
3	F	32	0	28	F	8	0
4	M	32	0	29	F	37	1
5	M	30	0	30	M	37	0
6	F	30	0	31	F	33	0
7	M	29	0	32	M	33	0
8	M	28	0	33	M	32	1
9	M	28	0	34	F	32	0
10	F	27	0	35	F	31	0
11	F	27	0	36	F	30	0
12	F	27	0	37	F	29	0
13	F	27	0	38	F	29	0
14	M	25	0	39	M	29	0
15	F	25	0	40	M	27	0
16	F	25	0	41	M	27	0
17	M	25	0	42	M	26	0
18	M	25	0	43	F	26	0
19	M	24	0	44	M	24	0
20	F	23	1	45	F	24	0
21	M	23	0	46	M	24	0
22	M	22	0	47	F	23	0
23	F	21	0	48	M	23	0
24	M	21	0	49	M	20	0
25	M	16	0	50	F	19	0

Table 19

## Creativity and Class Inclusion Scores

Subject	Sex	Creativity Score	Class Inclusion	Subject	Sex	Creativity Score	Class Inclusion
1	F	35	0	26	F	13	0
2	M	34	0	27	F	9	0
3	F	32	0	28	F	8	0
4	M	32	0	29	F	37	0
5	M	30	0	30	M	37	0
6	F	30	0	31	F	33	0
7	M	29	0	32	M	33	0
8	M	28	0	33	M	32	0
9	M	28	1	34	F	32	0
10	F	27	0	35	F	31	0
11	F	27	0	36	F	30	0
12	F	27	0	37	F	29	0
13	F	27	0	38	F	29	0
14	M	25	0	39	M	29	0
15	F	25	0	40	M	27	0
16	F	25	0	41	M	27	0
17	M	25	0	42	M	26	0
18	M	25	0	43	F	26	0
19	M	24	0	44	M	24	0
20	F	23	0	45	F	24	0
21	M	23	0	46	M	24	0
22	M	22	0	47	F	23	0
23	F	21	0	48	M	23	1
24	M	21	0	49	M	20	0
25	M	16	0	50	F	19	0

Table 20

## Creativity Scores and Sex of Kindergarten Children

Creativity Scores	Sex	Creativity Scores	Sex
35	F	13	F
34	M	9	F
32	F	8	F
32	M	37	F
30	M	37	M
30	F	33	F
29	M	33	M
28	M	32	M
28	M	32	F
27	F	31	F
27	F	30	F
27	F	29	F
27	F	29	F
25	M	29	M
25	F	27	M
25	F	27	M
25	M	26	M
25	M	26	F
24	M	24	M
23	F	24	F
23	M	24	M
22	M	23	F
21	F	23	M
21	M	20	M
16	M	19	F

## VITA

Patricia Ann Meyer, daughter of Judson and Mildred Poundstone, was born in Decatur, Illinois, on February 9, 1931. After completing Decatur High School, she entered James Millikin University and graduated from Illinois State Normal University in 1952 with a Bachelor of Science in Education degree. She taught kindergarten and primary grades for five years in the State of Illinois. In 1968 she received the Master of Education degree at East Texas State University with a major in Elementary Supervision. She served as a Graduate Assistant in the Elementary Education department at East Texas State University for two years and as an ad interim Instructor for two years. She received the Doctor of Education degree in Supervision, Curriculum and Instruction in August, 1976. She married Richard Carl Meyer on June 10, 1951. They have two daughters, Karen Ann and Kim Ellen, and one son, Kevin Todd.

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This dissertation was typed by Mrs. Jay Logue.