

COLOR PREFERENCES AND COLOR USAGE OF LOWER-CLASS NEGRO
THREE- AND FOUR-YEAR-OLD CHILDREN

by

Kathryn Carter Brunson

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SIGNED: Kathryn Carter Brunson

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Frances I. Stromberg
Frances I. Stromberg
Associate Professor of Home Economics

May 26, 1967
Date

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ABSTRACT

The purpose of this investigation was to study color preferences and color usage of lower-class Negro three- and four-year-old children. The null hypotheses to be tested were: (a) three- and four-year-old children have not developed color preferences, (b) three- and four-year old children will not be influenced in their color choice by the position of presentation of the colors, (c) three- and four-year-old children will not use the colors in order of sequence of presentation, (d) there will be no sex differences in color preferences, (e) there will be no sex differences in color usage.

Each child was asked to paint a picture on the easel using four colors, red, orange, blue, and green. Each child was also asked to choose a colored name tag. Four trials of the experiment were conducted.

The results of the data indicated that the subjects aged three and four, of either sex, have apparently not yet developed color preferences. The subjects, aged three and four of either sex, painted in the exact order of presentation of the colors to a statistically significant extent. The girls were more influenced by position in relation to first choice of color than were the boys.

Chapter I

INTRODUCTION

Research in the field of color and its relationships to young children has generally focused on the attitudes children hold for color as well as children's ability to discriminate among colors. Evidence tends to support the theory that children's as well as adults' feelings about color are the product of biological, cultural, and learning situations. However, the role each of these factors plays in color-mood associations is really not known. If the source of color-mood associations and color preferences could be found, it would possibly lead to a greater understanding of the affective value color holds for children as they mature. Several variables that could be considered for investigation are age, sex, race, and socio-economic status.

Several studies (Cook, 1931; Garth and Porter, 1934; Synolds and Pronko, 1949; Williams, 1933; Woelfel, 1930) reported findings which led to the conclusion that the ability to discriminate color increases in children with chronological age. This could be an indication that the young child, especially preschool age, has not developed color vision in the eye to the extent that the older child has; or it may indicate that color is not as important to the younger

child; therefore, he has less need to discriminate among colors. There is a definite need for more information about the affective quality color has for children of the various age groups.

The investigator contends that knowing how the young child feels about color and how he perceives it is of importance in planning for optimum learning experiences for the child. Knowing how young children feel about color could aid those who are involved in providing the child with rich experiences. If the child values color and color experimentation highly, his environment would be enhanced by his having many opportunities to see and work with color. If, however, the child is not as interested in color as he is in other aspects of his environment; or if his eyes have not yet developed sufficiently to differentiate among colors, it may be that extensive experiences with color would be more important when the child is more mature.

If color does have an emotional quality for the preschool child, then studies utilizing the child's use of color as one means of interpreting his art and emotional life (Alschuler and Hattwick, 1947) have much value. If, on the other hand, Lowenfeld (1957) is correct in his interpretation that before the age of four years color is of secondary importance to the young child, it would be a mistake to use color as a means of understanding the three-year-old child's emotional life.

Corcoran (1954) contends that the three-year-old child does not express color preferences, but instead is experimenting with color to test its affective value for him. According to Corcoran (1954) the

three-year-old may often use colors according to the order of presentation of the colors rather than because of his own color preferences.

The studies that have investigated sex differences in color discrimination and preference (Alschuler and Hattwick, 1947; Garth and Porter, 1934; Lawler and Lawler, 1965; Staples, 1932; Synolds and Pronko, 1949; and Woelfel, 1930) reached contradictory conclusions. There is no strong evidence that there are any definite sex differences of color discrimination or color preferences in young children.

Williams (1964) investigated color-mood associations in adults of different racial groups. He reported that color-mood associations were similar for Negro and Caucasians; however, slight differences between the racial groups in color-mood association were noted. A similar study of racial groups in relation to children's color preferences is needed.

Objectives

The purpose of this research generally was to study one aspect of color preferences and color usage of young children. The specific hypotheses tested, stated in the null form are:

1. Three- and four-year-old children have not developed color preferences.
2. There will be no sex differences in color preferences at ages three and four.

3. Three- and four-year-old children will not be influenced in their first choice of color by the position of presentation of the colors.

4. There will be no sex differences in the influence of position of presentation of the colors on the first choice of color at ages three and four.

5. Three- and four-year-old children will not use the colors in the exact sequential order of presentation.

6. There will be no sex differences in frequency of use of colors in the exact sequential order of presentation at ages three and four.

Chapter II

REVIEW OF LITERATURE

Color Vision

Within recent years there has been some investigation into the process that takes place when the human eye views color. Kapany (1960) explained the process of vision by describing the role of the retina. The retina of the eye consists of rods and cones upon which the image formed by the eye lens is focused. The rods and cones have a higher refractive index than the surrounding material, and the light that falls on them is transported down their length by internal reflection. The light is then converted into the visual stimulus.

Rushton (1962) drew a parallel between the camera that needs sensitive black and white film for twilight and color film for full daylight, and the retina with the same purpose as the two films. The rods are responsible for twilight vision; the photosensitive pigment used by the eye is rhodopsin or visual purple. The chemicals present in the cones are erythrolabe and chlorolabe. Rushton (1962) measured the presence of these two pigments. He felt a third pigment "blue catcher--a cyanolabe" was present, but he was not able to measure its presence.

Hirsch and Wick (1963) pointed out the importance of wavelength in color vision. Normal observers can detect very small differences in the dominant wavelength of two samples of color. This ability, however, varies with different parts of the spectrum. It is easier to distinguish yellows and blue-greens than blues or reds. A spectrum of color appears to be divided into three main parts: red, green, and blue. At the border between two main colors the hues change to other colors in a very short space on the spectrum. There are many different hues between two of the major colors of a spectrum, and these colors are very different in appearance; yet they are only slightly different physically (wavelength). The mixtures from colors of the spectrum differ from the mixture of pigments (Hirsch and Wick, 1963). The beams from both colors of light reach the eye. The wavelengths of each pigment color is absorbed by the other so that an intermediate wavelength reaches the eye. The primary colors when dealing with pigments are red, yellow, and blue. The primary colors of light are red, green, and blue.

Lepard (1956) defined vision as representing an integration of three systems which together produce a clear image in the consciousness. These systems are the visual pathway, eye movement and balance, and the higher centers. The visual pathway begins with the cornea of the eye and ends in the visual cortex of the brain.

Light impulses travel through the cornea, aqueous, lens, vitreous, and are received on the retina where they become nerve impulses. These then continue through optic nerve, optic chiasm, optic tracts, optic radiations, and finally arrive in consciousness in the visual cortex and higher centers. (Lepard, 1956, p. 196)

The study conducted by Land (1959) marked a completely new concept in color theory. Land (1959) pointed out that until his research, all color investigations had been based on the theory of primary colors. This theory was developed from the idea that three wavelengths of color could match all colors when mixed together. These wavelengths had to be chosen from the red, green, and blue bands of the spectrum; these colors became known as the primary colors of light. According to the three-color theory of vision, the eye responds to three different kinds of vibration, and all color sensation is the result of stimulating the three responses in varying degrees of strength. This theory of three-color vision seems to relate well to Rushton's (1962) theory of three color pigments being present in the cones.

Land's (1959) main criticism of the research done based on the theory of three-color vision was that the work did not deal with color as normally seen by the human being. The experimenters dealt with spots of light, then assuming this could apply to all color sensation. He asserted that the study of color vision in complete images rather than spots of light was a more appropriate technique.

Land's (1959) experiments with color included the use of complete images and two-color mixtures. He concluded: (a) color in natural images depends on a varying balance between longer and shorter wavelengths over the visual field; (b) to see color, the eye needs information about the long and short wavelengths being viewed; (c) "Color in the natural image depends on the random interplay of

longer and shorter wavelengths over the total visual field." (Land, 1959, p. 99); (d) rays are not in themselves color-making, but rather they are bearers of information the eye uses to assign colors to objects in an image.

Geschwind and Segal (1960) and Pastore (1960) followed the basic procedure of Land's (1959) study and investigated further the phenomenon of color vision. Geschwind and Segal (1960) reached the conclusion that "...the perception of colors of all hues from two-color mixtures cannot be a purely retinal effect, but must involve the interaction of higher centers." (Geschwind and Segal, 1960, p. 608)

Pastore (1960) reached a similar conclusion to that of Geschwind and Segal (1960) and stated "...the interaction of long and short wavelengths which results in the perception of color occurs in the brain, and not in the eye. (Pastore, 1960, p. 168)

Land (1959), Geschwind and Segal (1960), and Pastore (1960) conducted their studies with two-color mixtures. From these two-color mixtures, a complete range of colors was seen by the human eye. This is in direct contrast with the theory of three primary colors. Each of these three studies (Geschwind and Segal, 1960; Land, 1959; Pastore, 1960) seems to reinforce the findings of the others. It might then be assumed that a conclusion can be drawn that color vision does rely on a higher process of the brain. However, this conclusion cannot be drawn without noting with some emphasis a later study conducted by Land and Daw (1962). The experiments were conducted in a

method similar to those done by Land in his earlier research (Land, 1959). However, the results were not the same. Land and Daw (1962) drew the conclusion that the process by which color is formed could possibly be a process of the retina and did not necessarily have to be a process of the cerebral cortex. This conclusion is in direct contrast with the previous studies cited. It would then seem plausible to assume that more information is needed about color vision before definite conclusions can be drawn.

Color Discrimination

The study of color has not been limited to color vision in adults alone. Attention has been given to color vision in children as well as to the problem of determining the meaning color has for children.

Working with infants from 69 to 143 days old, Staples (1932) found that "the sensation for color as differing from the sensation produced by a gray of the same form and brightness, may be experienced and responded to by infants as young as three months." (Staples, 1932, p. 122) She also found a steady increase in frequency of positive responses to each of the colors up to the age of fifteen to eighteen months. In addition to infants, children of preschool age, school age, and adults served as subjects. The results of Staples' (1932) investigation led to the following conclusion:

Since the most marked differences in response occur between six and twelve months, and since beyond this age, group trends begin to disappear and individual differences become more pronounced, some phase of the development of color vision appears to be in progress during the first year of life. (Staples, 1932, p. 140)

Cook (1931), Woelfel (1930), Williams (1933), Garth and Porter (1934), and Synolds and Pronko (1949) reached similar conclusions in experiments testing young children's ability to discriminate color differences.

Cook (1931) reported accuracy in color matching and color naming increased with an increase in chronological age. Matching colors seemed to be more accurate when saturation of the colors was held constant and brightness varied, rather than when brightness was held constant and saturation varied. Colors were also named more accurately when saturation was held constant and brightness was the variable than when the situation was reversed.

Using an adaptation of the Ishihara Color Test (which consisted of colored numbers on a colored background) Woelfel (1930) reported a closer relationship between chronological age and the test score than between mental age and the test score. This may indicate some eye development is necessary to deal with color matching. The indication that eye development is necessary is reinforced by Woelfel's (1930) findings that matching colored numbers was a more difficult task than matching black and white numbers, as well as the fact that three retests of one child within one month showed only a slight practice effect with a strong tendency to make the same errors each time.

Garth and Porter (1934) reported older children, ages six to nineteen, had more ability to discriminate their own feeling for colors than did the younger children, ages one to six years. The children's ability to discriminate their feelings for color increased with chronological age.

When asked to outline colored numbers on a different hued background, Synolds and Pronko (1949) reported that the younger subjects, ages three, four, and five, were much lower in outlining ability than the older children, ages six, seven, and eight. Synolds and Pronko (1949) also pointed out that the results indicated not all hues are equally discernable. Of the four-year-olds, 100 per cent discriminated a red digit on a blue background, but only 75 per cent could see the reverse. A yellow digit on a green background was perceived by 94 per cent of the six-year-olds, but only 22 per cent could perceive the reverse.

It has been noted that studies dealing with color discrimination have reached similar conclusions. Older children were able to perform more proficiently than younger children on tests of discrimination ability. It now becomes even more significant that in tests dealing with the ability to recognize color harmony, Williams (1933) reached the same general conclusion. It was reported by Williams (1933) that a relationship exists between the age of the child and his sensitivity to the harmony of colors. Sensitivity to color harmony was reported of children as early as the fourth year, but

averages for the groups studied were not above a chance score until after the eighth year.

All of the studies that have been cited dealing with color discrimination and color harmony could lead to a general conclusion that ability to discriminate color relies somewhat on chronological age. This would lead to the belief that the young child's eyes may not be fully developed. Lepard (1956) pointed out that the human eye must mature as well as other parts of the body. The macula in the retina of a four-year-old has not developed to equal that of an eight-year-old. For this reason, visual acuity of the four- or five-year-old is often no better than 20/30.

Sex Differences

The experiments conducted by Staples (1932) with infants as well as older children indicated that girls reach a high level of response to color earlier than boys do. Staples (1932) felt the difference may be due to a more rapid development of color vision in girls; or provided equal ability to see the colors exists in girls and boys, the difference may indicate a greater interest in color by the girls and consequently a greater responsiveness.

Alschuler and Hattwick (1947) cited similar results. The colors used by girls tended to be more intense and persistent than those used by boys. They suggested that girls manifest emotion more than boys and reflect this in their use of color.

A study to determine the ability of young children to discriminate the feeling-values of colors lead Garth and Porter (1934) to state that boys discriminate the feeling-values of colors more than girls, even among children under six years of age.

Lawler and Lawler (1965) also investigated the ability of young children to discriminate the feeling-values of color. Color-mood associations in young children, reported Lawler and Lawler (1965), showed no sex differences of any significance.

Investigations by Synolds and Pronko (1949) and Woelfel (1930) reached similar conclusions to those of Lawler and Lawler (1965). Young children showed no evidence of sex differences in ability to discriminate among colors. "Differences between the sexes are less than those within the sexes." (Synolds and Pronko, 1949, p. 21)

The reported findings of the studies investigating the ability of boys and girls to discriminate among colors are conflicting. There is no strong evidence of any definite sex differences in color discrimination or color preferences.

Color Preferences

Blum and Dragositz (1947), Garth and Porter (1934), and Staples (1932) attempted to evaluate the meaning of color to young children by studying the color preferences of children. These studies reached the conclusion that yellow is not a popular color with children. Blum and Dragositz (1947) reported a decrease in the use of yellow from the first to sixth grade. Garth and Porter (1934),

when dealing with children ages one to six, reported that except for children under three, yellow was the least liked of all the colors. Staples (1932) noted that yellow was rated lower by school children than by preschool and it was rated even lower by adults than by school children.

Both Garth and Porter (1934) and Staples (1932) stated red was popular with young children up to kindergarten; the popularity of red then dropped during the school age years. Blue became increasingly popular in the school age group.

Staples (1932) studied color preferences of several ages. Infants from five to twenty-four months of age responded the greatest number of times to red. The frequency of responses was then greatest for yellow, blue, and green in that order. The order of preferences for color of children in the preschool age group was red, green, blue, and yellow. The differences between preferences was small. The order of preference for color by school aged children (Staples, 1932) was blue, red, green, and yellow. Staples (1932) listed the order of preference for color of adult men as blue, green, red, and yellow. The color preferences of adult women were listed as green, blue, red, and yellow.

Parallel with the idea of color preferences is the idea of color-mood associations. This refers to the phenomenon of a person looking at a particular color and associating the color with a mood such as happy, sad, or other moods.

Wefner (1954) studied the degree to which color hues are associated with mood-tones. The results indicated that some colors are more often associated with a particular mood than are others. Wefner (1954) felt the common associations of color and mood may be due to cultural and biological determinants as well as particular learning situations.

A study in fingerprinting technique by Napoli (1946) indicated that children do show preference for certain color choices and color combinations. The choice of these colors is interpreted by Napoli (1946) to be a result of different meanings attached to the colors. He pointed out that the immediate color preference of an individual has to do with a recent experience; in painting a series, however, an individual confirms his color choices by the predomination of a particular color throughout the series.

The results of research done in a study by Guilford (1940) indicate a "basic communality" of color preferences among individuals. Guilford (1940) differed from Wefner (1954) in that he felt the indications of common color preferences among his adult subjects rested on biological factors rather than biological and cultural factors and learning situations. This assumption was made by Guilford (1940) because he felt it was difficult to see how cultural factors could produce the continuity of color preferences found among the adult subjects of his study.

Recently, Lawler and Lawler (1965) began research based upon Guildford's (1940) theory that color-mood associations are based on

biological factors. They began the study with the assumption that if color-mood association exists in young children, who in comparison with adults have had a minimum amount of cultural conditioning, this could be support for Guilford's theory. The results of the study indicated color-mood associations were present in the preschool subjects. "The fact that preschool children who have been subjected to relatively little cultural conditioning have strong color-mood associations similar to those found in adults gives some support to Guilford's theory that color choices are biologically determined." (Lawler and Lawler, 1965, p. 31)

Research done by Williams (1964) supported that of other studies (Guilford, 1940; Lawler and Lawler, 1965; Napoli, 1946; Wefner, 1954); this study reported a high degree of consistency present in the connotative meanings associated with color names. The major difference found in the work done by Williams (1964) is that he included Negroes as part of the subjects under investigation. The meanings various colors held for the subjects were similar in relation to geographical area and racial membership. This is support for the idea that connotations of colors are learned by experiences common to most people; yet racial membership may have some impact on color preferences. "Although color names have similar meanings for Caucasians and Negroes, the meanings are not identical...it appears that general cultural influences predominate, but are modified to a degree by racial group membership." (Williams, 1964, p. 729)

Alschuler and Hattwick (1947) emphasized the importance of understanding color in relation to children's personalities. They contend that color gives a strong clue to the nature and degree of intensity of the emotional life of the young child. The drawings of this period reflect the children's impulses, natural drives, and obvious frustrations (Alschuler and Hattwick, 1947); therefore, color seems to be a language of the feelings of children. By observing children over a long period of time, Alschuler and Hattwick (1947) felt a definite connection could be made between a child's basic personality or behavior and the colors he used consistently. The free and easy emotional pattern exhibited by most of the children who used warm colors (red, orange, yellow) along with age data, indicated that warm colors are the expected color preference of preschool children who are developing in a usual or normal fashion. However, the nursery school children who consistently focused on cold colors (blue or green) tended to be more restraining or repressing of their inner feelings.

The study done by Alschuler and Hattwick (1947) dealt with other media as well as easel paints. They reported that easel paints were preferred over all other materials at the age level of three to three and one-half. This was also the age for the greatest spurt in color emphasis; which was interpreted (Alschuler and Hattwick, 1947) as an indication that children this age have gained control of their bodies so self-expression rather than manipulation is most important.

Lowenfeld (1957) contends that during the first stages of self-expression, ages two to four years, the child enjoys the use of

color, but color plays a subordinate role. The important experience to the child is the satisfaction of motor activity and later, the mastery and visual control of the lines. He also contends that a variety of colors may have a distracting effect during this early stage. Color holds an emotional quality for children (Lowenfeld, 1957); but it comes at a later stage. The first relationships the child forms with color come with the first representational attempts made by the child from the ages four to seven. Hurlock and Thompson (1934) state that children, ages four years six months to five years five months, use color for the pleasure they derive from the color itself.

Corcoran (1954) asserted that children age three, who may not yet have developed the relationships with color, may be influenced by the order of colors in the easel trough. His study was based on the observation that many nursery school children began to paint either with the extreme right-hand color or the extreme left-hand color. Many of the children then proceeded to use the successive colors in sequential order of presentation. The study was proposed to test the influence of the arrangements of paints upon the first choice made in painting. It was assumed that if a child did have a favorite color, his first choice from among the available colors would reflect that preference. Corcoran set up two postulates:

1. "The order of use of color by nursery school children in their easel paintings is influenced by the arrangement of colors in the easel trough." (Corcoran, 1954, pp. 107-108)

2. "Three-year-old children use colors in the sequential order of their arrangement to a significant extent." (Corcoran, 1954, pp. 107-108)

Twenty children, ten boys and ten girls, ranging in age from three years to three years ten months were included as subjects.

One double easel was set up in the painting area of the nursery school room. Four jars of paints were placed on each side of the easel. A $3/8$ inch bristle brush was placed in each jar so that the handles of the brushes projected upward toward the child at an angle of 180 degrees from the painting surface. Brushes and jars were wiped clean when each painting had been completed.

Each child painted twice with a different arrangement of colors for each painting. The order of colors for Phase One of the experiment was, from left to right, red, yellow, blue, and black. The order from left to right in Phase Two of the experiment was blue, black, red, and yellow. By interchanging the colors in this way, the colors which had been at the ends of the trough were substituted for those that had been in the center. The experimenter stood at the side of the easel and recorded the choices of the children as they painted.

Corcoran (1954) cited the following results: (a) no statistical difference was obtained between the choice of combined end positions and the choice of combined intermediate positions; however, a tendency to choose the end positions was observed from the fact that they were first choice 60 per cent of the time; (b) using the chi square test of significance, the evidence was significant at the .001

level that three-year-old children used colors at an easel in sequential order of presentation to a significant extent.

It might be said that the approach to painting among nursery school children of age three to four is one of directness of application of color rather than one of selective discrimination between and among colors. The mode of painting is to apply the color as it is spread out on the paper. This would explain, to some extent, why overlaying of color and painting out previously colored areas is so commonly observed among preschool children. What would appear, then, to be a seemingly mechanical approach is possibly better considered to be a rather efficient method by means of which children test the color to determine its affective value for them. (Corcoran, 1954, pp. 112-113)

Corcoran (1954) reported limitations of the experiment;

(a) only two arrangements of the four colors were used out of the possible twenty-four; (b) the four colors selected were an arbitrary selection; (c) the sample used was a selected one and may not hold for other groups of the same or different ages.

The evidence seems to indicate that the older children become, the more evident their preferences for certain colors and their ability to discriminate among colors become. However, with the preschool child, it is not clear whether or not preferences for colors are present, or if their ability to discriminate among colors is well developed.

Chapter III

PROCEDURE

The investigator felt that repeating the procedure carried out by Corcoran (1954) with some minor changes would not only reinforce the original study, but would also provide an opportunity for evaluation of the contributions made in each investigation. The need for more specific information of three- and four-year-old children's color preferences has been pointed out by the investigator in the review of literature.

Selection of the Subjects

The subjects of the present study were drawn from the Tucson Nursery School and the Office of Economic Opportunity Nursery School of Tucson, Arizona. All subjects were from the lower socio-economic class.

Socio-economic status was determined in the following manner. The children from the Tucson Nursery were identified with class membership according to the parent's occupation. The occupation of each parent was compared to the Socioeconomic Index for Occupations in the Detailed Classification of the Bureau of the Census: 1950 as reported by Reiss (1961). This index is based on income and occupational

information. Only those occupations which received a rating of 45 or below on the Socioeconomic Index were considered as belonging to the lower socioeconomic class. Occupations included in this rating were sales workers, service workers, and laborers.

The children from the Office of Economic Opportunity Nursery Schools were assumed to be from the lower socio-economic class since in order to qualify for the program, a family of four must have an income of less than \$3000 a year. This qualification applies to 90 per cent of the children in the program. The other 10 per cent of the children in the program did not come from families who met the income qualification. These children were identified by the program director, and they were not included in the present study.

All the subjects selected were Negro. Thirty-three subjects were included in the research. Thirteen of the subjects were three years to three years eleven months in age. Of these thirteen, five were boys and eight were girls. Twenty of the subjects ranged in age from four years to four years eleven months. Of these twenty, ten were boys and ten were girls. A summary of the description of the subjects may be found in Table 1.

Table 1

AGE AND SEX OF SUBJECTS

Age	Boys	Girls	Total
Four years	10	10	20
Three years	5	8	13
Total	15	18	33

Collection of Data

The easel was set up in a separate room of each nursery. The experimenter placed newspaper on the floor and easel board. A sheet of newsprint was placed over the newspaper on the easel back; the paper measured 12 by 18 inches. Four jars of paint were arranged in the easel trough at equal distance from each other. The brushes were placed in the jars of paint so the handles extended towards the child. The arrangement of paints was different for each of the four trials. The order of paints from left to right was as follows:

Trial One	red, orange, blue, green
Trial Two	orange, blue, green, red
Trial Three	blue, green, red, orange
Trial Four	green, red, orange, blue

By arranging the paints in this way, each color was in a different position for each trial.

The experimenter was introduced to each subject by the nursery school teacher in charge. The experimenter then asked the child if he would like to come with her into the other room to paint a picture. She also told the child that she had a name-tag for him, and when he

finished painting he could come back to what he was doing. If any child had not wished to paint, he would not have been required to do so; however, none of the subjects refused. The child was then guided to the separate room, where the easel board was set up, by the experimenter.

The experimenter then asked the child to pick a name-tag. He was presented with four name-tags which were the same four colors as the paints in the easel trough. The position of each colored name-tag corresponded to the position of each jar of paint in the easel trough. It was felt that this could serve as a double check of whether or not the children did have color preferences. The name-tags were made of construction paper that had been matched as closely as possible to the saturation and brightness of the tempera paint. The name-tags were presented to the child on a gray background held directly in front of him at waist level. The child picked the name-tag he wished; the experimenter then wrote the child's name on the tag and pinned it on a smock. The child was asked by the experimenter to put on the smock; he was told this would protect his clothing from the paint. The experimenter placed the smock on the child saying, "You may go ahead and paint." While the child painted, the experimenter, positioned behind and to one side of the child, observed and recorded the first four color choices made by the child. If the child wished to engage in conversation while painting, the experimenter did so, but did not encourage conversation.

After the child had finished painting, the experimenter placed the child's name-tag on the finished painting; the child was told this was so the experimenter would know to whom the painting belonged. The experimenter said she would like to keep the child's painting for a few days; but if he would like to have it, she would return it to him another time. The child was helped with removal of the smock; he was thanked and then lead back to the nursery room by the experimenter.

The brushes were wiped clean and a different sheet of newsprint was placed on the easel board before another child entered the room to begin painting.

Only one painting per child per day was considered. This meant each child painted four pictures on four different days. The trials were not always presented in the same order to each subject.

One experimenter conducted all four trials of the experiment. The entire procedure of easel painting and name-tag selection was practiced on a small group of children prior to the investigation reported so the same procedure was followed for each subject.

A color choice was recorded each time the child began to paint with another color. The experimenter recorded the first, second, third, and fourth choice of paint in terms of position and color of the paint. The use of color in the exact sequential order of presentation was noted for each trial. Choice of color and position of the name-tag selected for each trial were also recorded.

Treatment of Data

Reliability was accounted for in this study in that four trials, spaced by at least one day, were used for each child. Spacing the trials by a minimum time interval made it possible for the investigator to assume that the first choice of color in each trial was not influenced by the previous trials. Each trial could be considered independent of the others. Four trials of the investigation were included with the assumption that this would facilitate a more accurate measure of the child's use of colors and preference for colors. The name-tags served as a check on the validity of the findings of the painting experience. The experimenter recorded the child's first choices in the experimental situation and assumed the behavior was representative of the child; therefore the behavior was assumed to be valid.

The first choices of color in all four trials of easel painting and name-tag selection made by each subject were tested by chi-square in terms of color preference and color position as influenced by sex and age. The influence of sex and age on the frequency of the number of paintings in the exact sequential order of presentation of color by each subject was also tested by chi-square.

It is recognized by the investigator that chi-square requires independent samples. In the present use of chi-square, the samples represented are a total of each subject's responses in the four trials. It has been assumed that the samples included can be considered independent since each trial represented an entirely new situation for

each subject. However, the limitations this assumption places on the use of the X^2 test must be recognized; therefore, the chi-square values derived from the data were evaluated in terms of the individual differences of the subjects. This evaluation was facilitated by the use of contingency tables found in the Appendix.

Chapter IV

RESULTS

There is a possibility that the first choice of position in both painting and name-tag selection may be influenced by which hand the subject uses in the selection. Of the subjects selected for this research, only one was left-handed. Table 2 indicates the choices of the four-year-old boy who was left-handed.

Table 2

FIRST CHOICES OF POSITION OF LEFT-HANDED FOUR-YEAR-OLD BOY IN FOUR TRIALS OF EASEL PAINTING AND FOUR TRIALS OF NAME-TAG SELECTION

Easel Painting Position				Name Tag Selection Position			
a	b	c	d	a	b	c	d
1	1	1	1	1	1	0	2

This subject's first choice selections included most of the positions rather than favoring one. Only in the name-tag selections was one position favored. The extreme right-hand position was chosen first twice when selecting a name-tag. If this information is further categorized into left- and right-hand side positions as well as end and intermediary positions, the subject's responses are divided equally

between the left- and right-hand side positions and between the end and intermediary positions. This subject's first choices were almost random; therefore his responses do not greatly alter the general results of the data.

The first choices of color selected by three- and four-year-old subjects during each of the four trials of the painting experiment are summarized in Table 3. In Trial One, green ranked first for both the three- and four-year-old children. Green was first choice 40 per cent of the time by the four-year-old children, and it was first choice 54 per cent of the time by the three-year-old children. In Trial Two, blue was first choice most frequently by the four-year-old children. It was first choice by the four-year-old children 40 per cent of the time. In Trial Two, three-year-old children chose red first most frequently, choosing it first 38 per cent of the time. In Trial Three, both groups of children chose orange first most frequently. The four-year-olds chose orange first 55 per cent of the time, and the three-year-olds chose orange first 46 per cent of the time. In Trial Four, the most frequent first choice of color was blue. It was first choice 35 per cent of the time by the four-year-olds, and 62 per cent of the time by the three-year-olds. In three of the four trials of the four-year-old children's easel paintings, those colors most often selected as first choice occupied the extreme right-hand position in the trough. The extreme right-hand position was first choice by the three-year-olds in all four trials of easel painting.

Table 3

SUMMARY OF FIRST CHOICES AMONG FOUR COLORS OFFERED IN FOUR DIFFERENT ARRANGEMENTS
IN THE EASEL PAINTINGS OF THREE- AND FOUR-YEAR-OLD CHILDREN

Age	Trial 1				Trial 2				Trial 3				Trial 4			
	Color Order*				Color Order*				Color Order*				Color Order*			
	R	O	B	G	O	B	G	R	B	G	R	O	G	R	O	B
Age 4 (N=20)																
Frequency	3	3	6	8	2	8	4	6	4	1	4	11	5	3	5	7
Percentage			40				40				55				35	
Age 3 (N=13)																
Frequency	2	3	1	7	3	3	2	5	1	2	4	6	3	1	1	8
Percentage			54				38				46				62	

*Colors used were red, orange, blue and green.

The first choices of color selected by boys and girls during each of the four trials of the painting experience are summarized in Table 4. In Trial One, green, the color which occupied the extreme right-hand position, was first choice most frequently by both groups. The boys chose green first 53 per cent of the time, and the girls chose green first 39 per cent of the time. In Trial Two, blue, which occupied an intermediary left-hand side position, was first choice 47 per cent of the time by the boys while red, which occupied the extreme right-hand position, was first choice 50 per cent of the time by the girls. Red, which occupied the intermediary right-hand position, was first choice 40 per cent of the time by the boys in Trial Three; while the girls chose orange, the color occupying the extreme right-hand position, first 67 per cent of the time. Green, in the extreme left-hand position, was first choice by the boys 47 per cent of the time in Trial Four; the girls chose blue, in the extreme right-hand position, first 61 per cent of the time. In all four trials those colors which were first choice most frequently by the girls occupied the extreme right-hand position in the easel trough. The position selected first by the boys differed in each trial.

The first choices of color in the four trials of easel painting by three- and four-year-old children are summarized in Table 5. When all four trials of painting are combined, the distinctions among the colors selected first almost disappear. The four-year-old children selected blue first most frequently. When the

Table 4

SUMMARY OF FIRST CHOICES AMONG FOUR COLORS OFFERED IN FOUR DIFFERENT
ARRANGEMENTS IN THE EASEL PAINTINGS OF BOYS AND GIRLS

Sex	Trial 1				Trial 2				Trial 3				Trial 4			
	Color Order*				Color Order*				Color Order*				Color Order*			
	R	O	B	G	O	B	G	R	B	G	R	O	G	R	O	B
Boys (N=15)																
Frequency	3	1	3	8	4	7	2	2	4	0	6	5	7	2	2	4
Percentage	53				47				40				47			
Girls (N=18)																
Frequency	2	5	4	7	1	4	4	9	1	3	2	12	1	2	4	11
Percentage	39				50				67				61			

*Colors used were red, orange, blue and green.

chi-square test of significance is applied to these data, the resulting value of 2.30 does not reach the .05 level of significance; therefore, the observed frequency of first choices of blue by four-year-olds could not be considered to be statistically significant. The three-year-old children selected orange and blue as first choices equally, and they selected green as first choice only slightly more frequently. When the chi-square test is applied to these data, the resulting value does not reach the .05 level of significance; therefore, the observed frequency of first choices of green by three-year-olds could not be considered to be statistically significant. The chi-square test, when applied to both groups of subjects, did not reach the .05 level of significance; therefore, there was no real difference between the observed frequency of first choices of color by three- and four-year-old children. Neither three- nor four-year-olds chose a particular color first to a significant extent.

The first choices of color in the four trials of easel painting by boys and girls are summarized in Table 6. Combining all four trials of the painting experience sharply limits the distinctions among the first choice of colors in Table 4. The boys chose blue first 30 per cent of the time. When the chi-square test of significance is applied to these data, the resulting value of 1.74 does not reach the .05 level of significance; therefore, the observed frequency of first choices of blue by boys could not be considered statistically significant. The girls chose orange first 30 per cent of the time. The chi-square value of 2.11 does not reach the .05 level of

Table 5

SUMMARY OF FIRST CHOICES OF COLOR IN FOUR TRIALS OF EASEL
PAINTING BY THREE- AND FOUR-YEAR-OLD CHILDREN

Age	R	O	Colors*		X ²	P
			B	G		
Age 4 (N=20)						
Frequency	16	21	25	18	2.30	.70
Percentage	20	26	31	23		
Age 3 (N=13)						
Frequency	12	13	13	14	.148	.99
Percentage	23	25	25	27		
Total Group (N=33)					.72	.90

*Colors used were red, orange, blue and green.

Table 6

SUMMARY OF FIRST CHOICES OF COLOR IN FOUR TRIALS
OF EASEL PAINTING BY BOYS AND GIRLS

Sex	R	O	Colors*		X ²	P
			B	G		
Boys (N=15)						
Frequency	13	12	18	17	1.74	.70
Percentage	22	20	30	28		
Girls (N=18)						
Frequency	15	22	20	15	2.11	.70
Percentage	21	30	28	21		
Total Group (N=33)					1.68	.70

*Colors used were red, orange, blue and green.

significance; therefore the observed frequency of first choices of the color orange by girls could not be considered statistically significant. When the chi-square test of significance is applied to both groups, the score 1.68 does not reach the .05 level of significance; therefore, there was no real difference between the observed frequency of first choices of color by boys and girls. Neither boys nor girls chose a particular color first to a significant extent.

The first choices of color in the four trials of name-tag selection by three- and four-year-old children is summarized in Table 7. The four-year-old children chose an orange tag first 31 per cent of the time. When the chi-square test of significance is applied to these data, the resulting value of 3.70 is not significant at the .05 level; therefore, the observed frequency of the first choices of orange by four-year-old children could not be considered statistically significant. The three-year-olds selected both red and blue equally as a first choice slightly more often than either orange or green. The chi-square test of significance does not reach the .05 level of significance; therefore, the observed frequency of the first choices of red and blue by three-year-olds could not be considered statistically significant. The chi-square test, when applied to both groups, yields a value of 1.90 which does not reach the .05 level of significance; therefore, there is no significant difference between the observed frequency of first choices of color by three- and four-

Table 7

SUMMARY OF FIRST CHOICES OF COLOR IN FOUR TRIALS OF NAME-TAG
SELECTION BY THREE- AND FOUR-YEAR-OLD CHILDREN

Age	Colors*				X ²	P
	R	O	B	G		
Age 4 (N=20)						
Frequency	14	25	23	18	3.70	.30
Percentage		31				
Age 3 (N=13)						
Frequency	14	13	14	11	.46	.95
Percentage	27		27			
Total Group (N=33)					1.90	.70

*Colors used were red, orange, blue and green.

Table 8

SUMMARY OF FIRST CHOICES OF COLOR IN FOUR TRIALS OF
NAME-TAG SELECTION BY BOYS AND GIRLS

Sex	Colors*				X ²	P
	R	O	B	G		
Boys (N=15)						
Frequency	12	13	21	14	3.33	.50
Percentage			35			
Girls (N=18)						
Frequency	16	25	16	15	3.67	.30
Percentage		35				
Total Group (N=33)					3.73	.30

*Colors used were red, orange, blue and green.

year-old children. Neither three- nor four-year old children chose a particular color first to a significant extent.

The first choices of color in the four trials of name-tag selection by boys and girls is summarized in Table 8. Boys chose blue first most frequently when selecting a name-tag. The chi-square value of 3.33 does not reach the .05 level of significance; therefore the observed frequency of the first choices of blue by boys could not be considered statistically significant. Girls chose orange 35 per cent of the time. The chi-square value of 3.67 does not reach the .05 level; therefore the observed frequency of the first choices of orange by girls could not be considered statistically significant. The chi-square test, when applied to both groups, does not reach the .05 level of significance; therefore, there was no real difference between the first choices of color by boys and girls. Neither boys nor girls chose a particular color first to a significant extent.

The first choices of position in four trials of easel paintings of three- and four-year-old children are summarized in Table 9. The extreme right-hand position, d, was chosen first 40 per cent of the time by the four-year-old children. The chi-square value of 10.30 reaches the .02 level of significance; therefore, the observed frequency of the first choices of position d by the four-year-old children could be considered statistically significant. The three-year-old children chose position d first 50 per cent of the time. The chi-square value of 17.38 reaches the .001 level of significance; however, examination of the contingency table of age and position

indicates the first choices of position d were made predominantly by the girls of this group. The greater number of girls in the three-year-old group may have over-emphasized the value of chi-square; therefore, the observed frequency of the first choices of position d could not be considered significant. When the chi-square test is applied to both groups, the value of 2.03 does not reach the .05 level of significance.

The first choices of position in four trials of easel paintings by boys and girls are summarized in Table 10. Boys chose the extreme right-hand position, d, first 32 per cent of the time. The chi-square value of 3.60 is not significant; therefore, the observed frequency of the first choices of the extreme right-hand position by boys could not be considered statistically significant. The girls chose the extreme right-hand position, d, first 54 per cent of the time. When the chi-square test is applied to these data, the value of 35.67 reaches the .001 level of significance; therefore, the observed frequency of the first choices of the extreme right-hand position by girls could be considered statistically significant. The chi-square test, when applied to both groups, results in a value of 15.51; therefore, there was a significant difference at the .01 level between the observed frequency of first choices of position by boys and girls. Girls chose the extreme right-hand position to a significantly greater extent than boys.

Table 9

SUMMARY OF FIRST CHOICES OF POSITION IN FOUR TRIALS OF EASEL
PAINTING BY THREE- AND FOUR-YEAR-OLD CHILDREN

Age	Position				χ^2	P
	a	b	c	d		
Age 4 (N=20)						
Frequency	14	15	19	32	10.30	.02
Percentage				40		
Age 3 (N=13)						
Frequency	9	9	8	26	17.38	.001
Percentage				50		
Total Group (N=33)					2.03	.70

Table 10

SUMMARY OF FIRST CHOICES OF POSITION IN FOUR TRIALS
OF EASEL PAINTING BY BOYS AND GIRLS

Sex	Position				χ^2	P
	a	b	c	d		
Boys (N=15)						
Frequency	18	10	13	19	3.60	.50
Percentage				32		
Girls (N=18)						
Frequency	5	14	14	39	35.67	.001
Percentage				54		
Total Group (N=33)					15.51	.01

The first choices of positions in four trials of name-tag selection by three- and four-year-old children are summarized in Table 11. The four-year-olds chose the intermediary right-hand position, c, 35 per cent of the time. The chi-square value of 4.50 does not reach the .05 level of significance; therefore, the observed frequency of the first choices of the intermediary right-hand position, c, by the four-year-olds could not be considered significant. The three-year-olds chose the intermediary right-hand position, c, 44 per cent of the time. The chi-square value of 18.61 is significant at the .001 level; however, examination of the contingency table of age and position indicates the first choices of position c were selected predominantly by the girls of this group. The greater number of girls in the three-year-old group may have over-emphasized the resulting value of chi-square; therefore, the observed frequency of the first choices of the intermediary right-hand position, c, by three-year-olds could not be considered significant. When chi-square is applied to the three- and four-year-olds, it results in a value of 8.72 which is significant at the .05 level; however, when the individual differences of both groups were considered, the chi-square value could not be considered significant.

The first choices of positions in four trials of name-tag selection by boys and girls are summarized in Table 12. The boys chose the intermediary left-hand position, b, first 33 per cent of the time. The chi-square test results in a value which does not reach the .05 level of significance; the observed frequency of the first choices

Table 11

SUMMARY OF FIRST CHOICES OF POSITION IN FOUR TRIALS OF NAME-TAG
SELECTION BY THREE- AND FOUR-YEAR-OLD CHILDREN

Age	Position				χ^2	P
	a	b	c	d		
Age 4 (N=20)						
Frequency	17	16	28	19	4.50	.30
Percentage			35			
Age 3 (N=13)						
Frequency	7	18	23	4	18.61	.001
Percentage			44			
Total Group (N=33)					8.72	.05

Table 12

SUMMARY OF FIRST CHOICES OF POSITION IN FOUR TRIALS
OF NAME-TAG SELECTION BY BOYS AND GIRLS

Sex	Position				χ^2	P
	a	b	c	d		
Boys (N=15)						
Frequency	15	20	16	9	4.13	.20
Percentage		33				
Girls (N=18)						
Frequency	9	14	35	14	22.33	.001
Percentage			49			
Total Group (N=33)					9.56	.05

of the intermediary left-hand position by boys could not be considered significant. The girls chose the intermediary right-hand position, c, 49 per cent of the time. The resulting chi-square value is significant at the .001 level; therefore, the observed frequency of first choices of the intermediary right-hand position by girls could be considered significant. When the chi-square test of significance is applied to both groups, the resulting value of 9.56 is significant at the .05 level; therefore, there was a significant difference between the observed frequency of first choices of position by boys and girls in name-tag selection. Girls chose the intermediary position to a significantly greater extent than boys did.

A summary of first choices of end and intermediary positions in four trials of easel paintings of three- and four-year-old children is presented in Table 13. The four-year-old children chose the end positions first 58 per cent of the time. The chi-square value does not reach the .05 level of significance; therefore, the observed frequency of first choices of the end positions by four-year-olds could not be considered significant. The three-year-olds chose the end positions first 67 per cent of the time. The chi-square value of 5.56 is significant at the .02 level; however, when the individual differences were considered, the observed frequency of the first choices of the end positions by the three-year-old children could not be considered significant. When the chi-square test is applied to both groups, the value .649 does not reach the .05 level of significance;

therefore, there was no real difference between the observed frequency of first choices of end or intermediary positions by three- and four-year-olds.

The first choices of end and intermediary positions in four trials of easel paintings by boys and girls are summarized in Table 14. The boys chose the end positions first 62 per cent of the time. The chi-square test when applied to these data does not reach the .05 level of significance; therefore, the observed frequency of first choices of end positions in easel paintings by boys could not be considered significant. The girls chose the end positions 61 per cent of the time. The chi-square value of 3.26 does not reach the .05 level of significance; therefore, the observed frequency of first choices of end positions by the girls could not be considered significant. When chi-square is applied to the two groups, the resulting value of .014 does not reach the .05 level of significance; thus, there was no real difference between the frequency of first choices of end or intermediary between the frequency of first choices of end or intermediary positions by boys and girls.

The first choices of end and intermediary positions in four trials of name-tag selection by three- and four-year-old children are summarized in Table 15. The four-year-olds chose the intermediary positions first 55 per cent of the time. The chi-square value of .61 does not reach the .05 level of significance; therefore, the observed frequency of first choices of intermediary positions by four-year-olds could not be considered statistically significant. The three-year-olds

Table 13

SUMMARY OF FIRST CHOICES OF END AND INTERMEDIARY POSITIONS
IN FOUR TRIALS OF EASEL PAINTING BY THREE- AND
FOUR-YEAR-OLD CHILDREN

Age	Ends	Position		X ²	P
		Intermediary			
Age 4 (N=20)					
Frequency	46	34		1.51	.30
Percentage	58				
Age 3 (N=13)					
Frequency	35	17		5.56	.02
Percentage	67				
Total Group (N=33)				.649	.50

Table 14

SUMMARY OF FIRST CHOICES OF END AND INTERMEDIARY POSITIONS
IN FOUR TRIALS OF EASEL PAINTING BY BOYS AND GIRLS

Sex	Ends	Position		X ²	P
		Intermediary			
Boys (N=15)					
Frequency	37	23		2.82	.10
Percentage	62				
Girls (N=18)					
Frequency	44	28		3.26	.10
Percentage	61				
Total Group (N=33)				.014	.95

chose the intermediary positions 79 per cent of the time. The chi-square value is significant at the .001 level; therefore, the observed frequency of the first choices of the intermediary positions by three-year-old children could be considered statistically significant. When chi-square is applied to the two groups, the resulting value of 7.75 is significant at the .01 level; therefore, there was a difference between the observed frequency of first choices of the intermediary positions by three- and four-year-old children. The three-year-olds chose the intermediary positions to a statistically greater extent than did the four-year-olds.

The first choices of end and intermediary positions in four trials of name-tag selection by boys and girls are summarized in Table 16. Boys chose the intermediary position first 60 per cent of the time. The chi-square test applied to this data, does not yield a value significant at the .05 level; therefore, the observed frequency of first choices of intermediary positions by boys could not be considered statistically significant. The girls chose the intermediary position first 68 per cent of the time. The chi-square value of 8.68 reaches the .01 level of significance; therefore, the observed frequency of first choices of the intermediary positions by girls could be considered statistically significant. When chi-square is applied to both boys and girls, the resulting value of .832 does not reach the .05 level of significance.

Table 15

SUMMARY OF FIRST CHOICES OF END AND INTERMEDIARY POSITIONS
IN FOUR TRIALS OF NAME-TAG SELECTION BY THREE-
AND FOUR-YEAR-OLD CHILDREN

Age	Ends	Position Intermediary	X^2	P
Age 4 (N=20)				
Frequency	36	44	.61	.50
Percentage		55		
Age 3 (N=13)				
Frequency	11	41	16.16	.001
Percentage		79		
Total Group (N=33)			7.75	.01

Table 16

SUMMARY OF FIRST CHOICES OF END AND INTERMEDIARY POSITIONS
IN FOUR TRIALS OF NAME-TAG SELECTION BY BOYS AND GIRLS

Sex	Ends	Position Intermediary	X^2	P
Boys (N=15)				
Frequency	24	36	2.02	.20
Percentage		60		
Girls (N=18)				
Frequency	23	49	8.68	.01
Percentage		68		
Total Group (N=33)			.832	.50

The first choices of left- and right-hand side positions in four trials of easel paintings of three- and four-year-old children are summarized in Table 17. Four-year-olds chose the right-hand side positions first 64 per cent of the time. The chi-square value reaches the .02 level of significance; however, examination of the contingency table of age and position reveals that the first choices of the right-hand side positions were selected predominantly by the girls of this group. The observed frequency of first choices of the right-hand side positions could not be considered significant. The three-year-olds chose the right-hand side positions first 65 per cent of the time. The chi-square value of 4.30 reaches the .05 level of significance; however, examination of the contingency table of age and position reveals that the first choices of the right-hand side positions were selected predominantly by the girls of this group. The greater number of girls in the three-year-old group may have over-emphasized the chi-square value; therefore, the observed frequency of the first choices of the right-hand side positions by girls could not be considered significant. A chi-square value of .078 results from a combination of the two groups; this does not reach the .05 level of significance. There was no real difference between the observed frequency of first choices of the right-hand side positions by three- and four-year-old children. In both groups the observed frequency of first choices of the right-hand side positions seemed significant; but in both groups the selection of the right-hand side was made predominantly by the girls.

Table 17

SUMMARY OF FIRST CHOICES OF LEFT- AND RIGHT-HAND SIDE POSITIONS
IN FOUR TRIALS OF EASEL PAINTING BY THREE- AND
FOUR-YEAR-OLD CHILDREN

Age	Left	Position Right	X^2	P
Age 4 (N=20)				
Frequency	29	51	5.51	.02
Percentage		64		
Age 3 (N=13)				
Frequency	18	34	4.30	.05
Percentage		65		
Total Group (N=33)			.078	.80

Table 18

SUMMARY OF FIRST CHOICES OF LEFT- AND RIGHT-HAND SIDE POSITIONS
IN FOUR TRIALS OF EASEL PAINTING BY BOYS AND GIRLS

Sex	Left	Position Right	X^2	P
Boys (N=15)				
Frequency	28	32	.150	.95
Percentage		53		
Girls (N=18)				
Frequency	19	53	15.12	.001
Percentage		74		
Total Group (N=33)			5.69	.02

The first choices of left- and right-hand side positions in four trials of easel paintings of boys and girls are summarized in Table 18. The boys chose the right-hand side first 53 per cent of the time. The chi-square value of .150 does not reach the .05 level of significance; therefore, the observed frequency of first choices of the right-hand side positions by the boys could not be considered statistically significant. The girls chose the right-hand side positions first 74 per cent of the time. The chi-square value 15.12 reaches the .001 level of significance; therefore, the observed frequency of first choices of the right-hand side positions by girls could be considered statistically significant. When the chi-square test is applied to both groups, the resulting value of 5.69 reaches the .02 level of significance. The difference between the observed frequency of the first choices of the right-hand side positions by boys and girls could be considered statistically significant. The girls chose the right-hand side to a greater extent than did the boys.

The first choices of left- and right-hand side positions in four trials of name-tag selection of three- and four-year-old children are summarized in Table 19. The four-year-old children chose the right-hand side first 59 per cent of the time. The chi-square value does not reach the .05 level of significance; therefore, the observed frequency of first choices of the right-hand side positions by four-year-old children could not be considered statistically significant. The three-year-olds chose the right-hand side positions first 52 per cent of the time. The chi-square value does not reach the .05

Table 19

SUMMARY OF FIRST CHOICES OF LEFT- AND RIGHT-HAND SIDE POSITIONS
IN FOUR TRIALS OF NAME-TAG SELECTION BY THREE-
AND FOUR-YEAR-OLD CHILDREN

Age	Left	Position Right	χ^2	P
Age 4 (N=20)				
Frequency	33	47	2.11	.20
Percentage		59		
Age 3 (N=13)				
Frequency	25	27	.019	.90
Percentage		52		
Total Group (N=33)			.29	.70

Table 20

SUMMARY OF FIRST CHOICES OF LEFT- AND RIGHT-HAND SIDE POSITIONS
IN FOUR TRIALS OF NAME-TAG SELECTION BY BOYS AND GIRLS

Sex	Left	Position Right	χ^2	P
Boys (N=15)				
Frequency	35	25	1.35	.30
Percentage	58			
Girls (N=18)				
Frequency	23	49	8.68	.01
Percentage		68		
Total Group (N=33)			8.94	.01

level of significance; therefore, the observed frequency of first choices of the right-hand side positions by four-year-old children could not be considered statistically significant. The three-year-olds chose the right-hand side positions first 52 per cent of the time. The chi-square value does not reach the .05 level of significance; therefore, the observed frequency of the first choices of the right-hand side positions by three-year-old children could not be considered significant. When the chi-square test is applied to both groups, the resulting value of .29 does not reach the .05 level of significance; therefore, there was no real difference between the observed frequency of the first choices of the right-hand side positions by three- and four-year-old children. Neither group chose the right-hand side positions to a statistically significant extent.

The first choices of left- and right-hand side positions in four trials of name-tag selection by boys and girls are summarized in Table 20. Boys chose the left-hand side first 58 per cent of the time. The chi-square value does not reach the .05 level of significance; therefore, the observed frequency of first choices of the left-hand side positions by boys could not be considered significant. Girls chose the right-hand side positions first 68 per cent of the time. The chi-square value of 8.68 is significant at the .01 level; therefore, the observed frequency of first choices of the right-hand side positions by girls could be considered statistically significant. When chi-square is applied to both groups, the resulting value of 8.94 reaches the .01 level of significance; therefore, there was a

statistically significant difference between the observed frequency of first choices of the right-hand side positions by boys and girls. The girls chose the right-hand side positions to a greater extent than did the boys.

The frequency of the use of colors in the exact sequential order of presentation from left to right or right to left in the four trials of easel painting by four-year-old children is presented in Table 21. Thirteen of the twenty children painted in sequential order at least once during the four trials. The sequence a, b, c, d, or d, c, b, a would be expected to occur by chance once in every twelve paintings; in 80 paintings it would be expected to occur 6.66 times. The use of paints in the exact sequential order of presentation by four-year-olds occurred 26 times. The chi-square value of 58.12 reaches the .001 level of significance; therefore, the observed frequency of sequential paintings by four-year-old children could be considered statistically significant.

The frequency of the use of colors in the exact sequential order of presentation from left to right or right to left in the four trials of easel painting by three-year-old children is presented in Table 22. Eight of the thirteen children painted in sequential order at least once during the four trials. The sequence a, b, c, d or d, c, b, a would be expected to occur by chance 4.44 times in 52 paintings; it occurred 20 times. When the chi-square test was employed, the resulting value of 55.85 indicates that the frequency of sequential paintings by three-year-old children could be considered significant at the .001 level.

Table 21

FREQUENCY OF THE USE OF COLOR IN THE EXACT SEQUENTIAL ORDER
OF PRESENTATION IN FOUR TRIALS OF EASEL PAINTING
BY FOUR-YEAR-OLD CHILDREN

Case	Trial 1	Trial 2	Trial 3	Trial 4	Total
1					0
2					0
3				x	1
4					0
5		x	x		2
6			x	x	2
7			x		1
8	x	x	x	x	4
9					0
10			x		1
11				x	1
12					0
13				x	1
14			x		1
15		x	x		2
16					0
17	x	x	x	x	4
18					0
19		x	x		2
20	x	x	x	x	4
$\chi^2 = 58.12$					26

Table 22

FREQUENCY OF THE USE OF COLOR IN THE EXACT SEQUENTIAL ORDER
OF PRESENTATION IN FOUR TRIALS OF EASEL PAINTING
BY THREE-YEAR-OLD CHILDREN

Case	Trial 1	Trial 2	Trial 3	Trial 4	Total
1			x	x	2
2	x	x	x	x	4
3					0
4					0
5	x		x	x	3
6					0
7	x			x	2
8	x	x	x		3
9				x	1
10					0
11		x			1
12					0
13	x	x	x	x	4
					$\chi^2 = 55.85$
					20

The frequency of the use of colors in the exact sequential order of presentation from left to right or right to left in the four trials of easel painting by boys is presented in Table 23. Nine of the fifteen boys painted in sequential order at least once during the four trials. The sequence a, b, c, d or d, c, b, a would be expected to occur 5 times in 60 paintings; it occurred 17 times. The chi-square value of 28.85 is above the .001 level of significance; therefore, the observed frequency of sequential painting by boys could be considered significant.

The frequency of the use of colors in the exact sequential order of presentation from left to right or right to left in the four trials of easel painting by girls is presented in Table 24. Twelve of the eighteen children painted in sequential order at least once during the four trials. The sequence a, b, c, d or d, c, b, a would be expected to occur 6 times in 72 paintings; it occurred 29 times. The chi-square value of 92.04 is significant at the .001 level; therefore, the observed frequency of sequential paintings by girls could be considered statistically significant.

A summary of the use of color in the exact sequential order of presentation from left to right or right to left of three- and four-year-old children is presented in Table 25. The four-year-olds painted sequentially 26 times out of 80. The three-year-olds painted sequentially 20 times out of 52. The chi-square value of .32 does not reach the .05 level of significance; therefore there was no significant difference between the observed frequency of the use of color in the

Table 23

FREQUENCY OF THE USE OF COLOR IN THE EXACT SEQUENTIAL ORDER
OF PRESENTATION IN FOUR TRIALS OF EASEL PAINTING BY BOYS

Case	Trial 1	Trial 2	Trial 3	Trial 4	Total
1					0
2					0
3	x		x	x	3
4					0
5	x			x	2
6			x		1
7				x	1
8					0
9				x	1
10			x		1
11	x	x			2
12					0
13	x	x	x	x	4
14					0
15		x	x		2
					$\chi^2 = 28.85$
					17

Table 24

FREQUENCY OF THE USE OF COLOR IN THE EXACT SEQUENTIAL ORDER
OF PRESENTATION IN FOUR TRIALS OF EASEL PAINTING BY GIRLS

Case	Trial 1	Trial 2	Trial 3	Trial 4	Total
1			x	x	2
2	x	x	x	x	4
3					0
4				x	1
5		x			1
6					0
7	x	x	x	x	4
8					0
9					0
10				x	1
11					0
12		x	x		2
13			x	x	2
14			x		1
15	x	x	x	x	4
16	x	x	x	x	4
17					0
18	x	x	x		3
					29

$\chi^2 = 92.04$

exact sequential order of presentation by three- and four-year-old children. Both groups painted sequentially to a significant extent.

Table 25

SUMMARY OF THE USE OF COLOR IN THE EXACT SEQUENTIAL ORDER OF PRESENTATION IN FOUR TRIALS OF EASEL PAINTINGS OF THREE- AND FOUR-YEAR-OLD CHILDREN

Age	Paintings		Total
	Sequential	Non-sequential	
Age 4 (N=20) Number	26	54	80
Age 3 (N=13) Number	20	32	52
χ^2	.32		

A summary of the use of color in the exact sequential order of presentation from left to right or right to left of boys and girls is presented in Table 26. The boys painted sequentially 17 times out of 60. The girls painted sequentially 29 times out of 72. The chi-square value of 1.71 does not reach the .05 level of significance; therefore, there was no real difference between the observed frequency of the use of color in the exact sequential order of presentation by boys and girls. Both groups painted sequentially to a significant extent, however.

Table 26

SUMMARY OF THE USE OF COLOR IN THE EXACT SEQUENTIAL ORDER OF
PRESENTATION IN FOUR EASEL PAINTINGS BY BOYS AND GIRLS

Sex	Paintings		Total
	Sequential	Non-sequential	
Boys (N=15) Number	17	43	60
Girls (N=18) Number	29	43	72
χ^2	1.71		

Chapter V

SUMMARY AND CONCLUSIONS

The null hypothesis stating that three- and four-year-old children have not developed color preferences could not be rejected at the .05 level of significance. Neither in the easel painting trials nor in the name-tag selection did the observed frequency of first choices of color by three- and four-year-olds reach the .05 level of significance. It may be concluded that the three- and four-year-old children in this study did not show a preference for any of the four colors used in the experimental situation.

The null hypothesis that there would be no sex differences in color preferences at age three and four could not be rejected. Neither in the painting experience nor in the name-tag selection did the observed frequency of first choices of color by boys and girls reach the .05 level of significance. It may be concluded that the boys and girls in this study did not show a preference for any of the four colors used in the experimental situation.

The null hypothesis stating that three- and four-year-old children will not be influenced in their first choice of color by the position of presentation of the colors could not be rejected; the observed frequency of first choices of color by position by three- and

four-year-olds did not consistently reach the .05 level of significance. It may be concluded that the position of colors did not influence the three- and four-year-old subjects' first choices of color.

The null hypothesis stating there will be no sex differences in the influence of position of presentation of the colors on the first choice of color at ages three and four could be rejected at the .02 level of significance. In both the easel painting trials and the name-tag selections the observed frequency of first choices of color, in terms of position, by girls was significantly greater than the first choices of color, in terms of position, by boys. It may be concluded that position influenced the girls' first choices of color to a significantly greater extent than it did boys.

The null hypothesis that three- and four-year-old children will not use the colors in the exact sequential order of presentation could be rejected; the observed frequency of sequential paintings by three- and four-year-olds reached the .001 level of significance. It may be concluded that three- and four-year-old subjects painted in the exact sequential order of presentation of the colors to a significant extent.

The null hypothesis that there will be no sex differences in frequency of use of colors in the exact sequential order of presentation at ages three and four could not be rejected; the observed frequency of sequential paintings by both boys and girls reached the .001 level of significance. It may be concluded that boys and girls

painted in the exact sequential order of presentation of the colors to a significant extent.

Discussion

The results of the data indicate that young children, aged three and four, of either sex, have apparently not yet developed color preferences. Color itself rather than a particular color may hold a primary value for children. It may be that many colors hold a fascination for the child so that he is not ready to limit his responses to these colors. The evidence that children paint in the exact order of presentation of the colors to a significant extent seems to add to the idea that children are interested in color in general rather than a particular color. By using the colors in the exact order of presentation (thereby using all the available colors) young children may be using the most effective means of experimenting with every color. Before a child can have a favorite color, he must know how he feels about the different colors and which colors hold real value for him. Painting sequentially may also be the most effective means the child has of experimenting with the colors to investigate the qualities of the media.

Sex differences seem to be present in the child's first choice of color. It has been pointed out that girls tended to choose the color in terms of its position to a greater extent than did boys. Position, then, was a greater influencing factor in first choices of color for the girls than it was for the boys. It may be that girls

were influenced in their first choices of color by the accessibility of the color. All the girl subjects in this study were right-handed, and the first choices of positions were predominantly from the right half of the easel trough and name-tag tray. It cannot be assumed that the hand girls used to select the color did not influence the first choice of color in terms of position.

The influence of position on the girls' first choices of color may indicate that girls had a more patterned or fixed response to the color situations. Whether or not this patterned behavior is characteristic of other responses girls make to either new situations or the everyday environment is a question that deserves consideration.

If girls do indeed react to situations in a patterned or fixed manner, the implications this has for those working with children are tremendous. If there are sex differences in terms of response to the environment, these need to be recognized and taken into account in providing the most beneficial environment for learning. Understanding the child's responses to the environment may lead to a more complete understanding of how the child learns.

Suggestions for Further Research

Consideration of the findings in this study and the findings of other investigators as noted in the Review of Literature suggest certain interpretations and implications for understanding behavior of young children. In order to further verify the findings and provide additional information, the investigator proposes the

following suggestions for further research.

1. Repeat the study to investigate the influence of race and socio-economic status on color preferences and color usage.

2. Repeat the study with children of grade-school age to see if color preferences and color usage take on a different value for the child in the later developmental stages of childhood.

3. Repeat the study with a larger group of children in order to obtain a more representative sample of the population.

4. Study young children in terms of those who show color preferences and those who do not to determine what variables other than age or sex may be related to color preferences of these children.

5. Study color in terms of how long the child paints with one particular color rather than which color he chooses first to see if a color preference is revealed through length of time the color is used.

6. Study behavior responses of boys and girls in terms of patterned responses to various situations other than choice of color in a painting situation.

7. Study the techniques children employ when painting such as covering the paper with one color, overlaying one color on another and other techniques observed by the experimenter during this study. These techniques may be other indications of patterned responses by the child in the painting situation and could lead to an understanding of the child's responses in various situations.

A P P E N D I X

Contingency Tables of Age and Sex to Color Preference

Table 27

FIRST CHOICES OF COLOR IN FOUR TRIALS OF EASEL PAINTING
BY THIRTY-THREE NURSERY SCHOOL CHILDREN

Age	Sex	Colors*				Total
		R	O	B	G	
4	Boy	1	0	1	2	4
4	Boy	1	0	1	2	4
4	Boy	1	0	1	2	4
4	Boy	1	1	2	0	4
4	Boy	0	3	0	1	4
4	Boy	1	1	1	1	4
4	Boy	1	0	2	1	4
4	Boy	0	1	2	1	4
4	Boy	2	0	2	0	4
4	Boy	0	2	1	1	4
4	Boy	1	0	1	2	4
4	Girl	1	2	1	0	4
4	Girl	1	1	1	1	4
4	Girl	2	0	0	2	4
4	Girl	1	1	2	0	4
4	Girl	0	1	2	1	4
4	Girl	1	1	2	0	4
4	Girl	0	2	2	0	4
4	Girl	1	1	1	1	4
4	Girl	0	3	0	1	4
4	Girl	1	1	1	1	4
3	Boy	1	2	0	1	4
3	Boy	2	2	0	0	4
3	Boy	1	0	2	1	4
3	Boy	1	0	1	2	4
3	Boy	0	0	2	2	4
3	Girl	0	2	1	1	4
3	Girl	1	1	1	1	4
3	Girl	1	1	0	2	4
3	Girl	2	1	1	0	4
3	Girl	1	1	1	1	4
3	Girl	1	1	1	1	4
3	Girl	0	2	1	1	4
3	Girl	1	0	2	1	4
TOTAL	33	28	34	38	32	132

*Colors used were red, orange, blue, and green.

Table 28

FIRST CHOICES OF COLOR IN FOUR TRIALS OF NAME-TAG SELECTION
BY THIRTY-THREE NURSERY SCHOOL CHILDREN

Age	Sex	Colors*				Total
		R	O	B	G	
4	Boy	0	1	1	2	4
4	Boy	1	0	1	2	4
4	Boy	2	1	1	0	4
4	Boy	0	1	2	1	4
4	Boy	1	0	2	1	4
4	Boy	1	1	1	1	4
4	Boy	0	1	3	0	4
4	Boy	1	2	1	0	4
4	Boy	1	1	1	1	4
4	Boy	1	1	1	1	4
4	Girl	0	1	1	2	4
4	Girl	0	4	0	0	4
4	Girl	0	3	0	1	4
4	Girl	2	1	0	1	4
4	Girl	1	1	2	0	4
4	Girl	1	1	2	0	4
4	Girl	0	2	1	1	4
4	Girl	1	1	1	1	4
4	Girl	0	2	1	1	4
4	Girl	1	0	1	2	4
3	Boy	1	1	2	0	4
3	Boy	2	0	1	1	4
3	Boy	0	1	1	2	4
3	Boy	1	0	1	2	4
3	Boy	0	2	2	0	4
3	Girl	0	1	1	2	4
3	Girl	1	1	1	1	4
3	Girl	1	0	3	0	4
3	Girl	1	1	1	1	4
3	Girl	2	2	0	0	4
3	Girl	2	1	0	1	4
3	Girl	1	1	1	1	4
3	Girl	2	2	0	0	4
TOTAL	33	28	38	37	29	132

*Colors used were red, orange, blue, and green.

Contingency Tables of Age and Sex to Position

Table 29

FIRST CHOICES OF POSITION IN FOUR TRIALS OF EASEL PAINTINGS
BY THIRTY-THREE NURSERY SCHOOL CHILDREN

Age	Sex	Position				Total
		a	b	c	d	
4	Boy	2	2	0	0	4
4	Boy	0	0	2	2	4
4	Boy	1	1	2	0	4
4	Boy	0	2	0	2	4
4	Boy	2	1	0	1	4
4	Boy	0	1	3	0	4
4	Boy	1	0	0	3	4
4	Boy	2	0	0	2	4
4	Boy	2	0	0	2	4
4	Boy	1	1	1	1	4
4	Girl	0	1	2	1	4
4	Girl	1	2	1	0	4
4	Girl	1	1	0	2	4
4	Girl	1	0	3	0	4
4	Girl	0	0	2	2	4
4	Girl	0	0	1	3	4
4	Girl	0	2	0	2	4
4	Girl	0	0	0	4	4
4	Girl	0	1	2	1	4
4	Girl	0	0	0	4	4
3	Boy	3	0	0	1	4
3	Boy	2	0	2	0	4
3	Boy	0	1	1	2	4
3	Boy	1	0	1	2	4
3	Boy	1	1	1	1	4
3	Girl	1	0	0	3	4
3	Girl	0	2	0	2	4
3	Girl	1	0	0	3	4
3	Girl	0	3	1	0	4
3	Girl	0	0	0	4	4
3	Girl	0	0	0	4	4
3	Girl	0	1	1	2	4
3	Girl	0	1	1	2	4
TOTAL	33	23	24	27	58	132

Table 30

FIRST CHOICES OF POSITION IN FOUR TRIALS OF NAME-TAG SELECTION
BY THIRTY-THREE NURSERY SCHOOL CHILDREN

Age	Sex	Position				Total
		a	b	c	d	
4	Boy	1	2	1	0	4
4	Boy	2	0	0	2	4
4	Boy	2	1	0	1	4
4	Boy	3	0	1	0	4
4	Boy	1	1	2	0	4
4	Boy	0	2	0	2	4
4	Boy	0	3	1	0	4
4	Boy	0	0	2	2	4
4	Boy	1	1	0	2	4
4	Boy	1	1	2	0	4
4	Girl	1	1	2	0	4
4	Girl	0	0	2	2	4
4	Girl	0	1	3	0	4
4	Girl	0	0	4	0	4
4	Girl	0	0	3	1	4
4	Girl	2	0	0	2	4
4	Girl	1	1	0	2	4
4	Girl	1	0	1	2	4
4	Girl	1	1	1	1	4
4	Girl	0	1	3	0	4
3	Boy	1	3	0	0	4
3	Boy	1	3	0	0	4
3	Boy	0	1	3	0	4
3	Boy	0	2	2	0	4
3	Boy	2	0	2	0	4
3	Girl	0	1	3	0	4
3	Girl	1	2	1	0	4
3	Girl	1	0	1	2	4
3	Girl	0	0	4	0	4
3	Girl	1	2	1	0	4
3	Girl	0	1	2	1	4
3	Girl	0	1	2	1	4
3	Girl	0	2	2	0	4
TOTAL	33	24	34	51	23	132

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