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GROWTH OF COLOR DISCRIMINATION AMONG
SCHOOL CHILDREN IN GRADES ONE TO SIX

being

A thesis presented to the Graduate
Faculty of the Fort Hays Kansas State
College in partial fulfillment of the
requirements for the Degree of Master
of Science

by

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Fort Hays Kansas State College

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Chr. Graduate Council

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P A R T I

INTRODUCTION

This thesis proposes to study color responses of school children from grades one to six inclusive. It endeavors to show the development of color discrimination in the school child.

The problem begins with the knowledge that the first grade child possesses in reference to color, with his preference in regard to color combinations, and with his response to color qualities and space areas. The first grade child lives in a different world from that of a sixth grade child. At each grade level the child becomes more conscious of the outside world. He is influenced by many new forces. The aim of this thesis is to discover the extent to which the child's color sense matures as he grows from year to year or grade to grade. In other words, this thesis attempts to find the level of color understanding of both boys and girls in grades one to six.

The findings are of value to teachers in presenting material to children by means of colored charts, bulletin board arrangements, blackboard decorations, and room decorations. It is well known that pleasing decorative ef-

fects and harmonious surroundings are conducive to learning.

Art instructors might profit by using the results of these tests in their teaching of color. For the test results show the preference of children for different color harmonies and their reactions toward balance, value, and color repetition. These results also show at what grade level pupils become conscious of the various color combinations. Hence they may be of aid to the art teacher in planning instruction in color usage.

The teacher achieves her best results by following and directing the inclinations of the child. Some children may work better with color by following their natural feeling-responses. Such children should be encouraged to develop their own particular color sense, yet training in color sensation and in color discrimination for all children furthers artistic appreciation.

Psychologists, educators, and artists have all speculated regarding color preferences of children. Some testing has been done, yet there is much controversy regarding the child's innate ability to choose the better art forms. Controversy prevails over the question of whether the child's choice changes as he advances to a higher grade. Another basis for dispute is the difference in choices between girls and boys. Prevalent be-

liefs hold that children have a natural sense of balance and that they will choose the more striking contrasts and the simpler forms.

This thesis will attempt to ascertain through a series of group tests which color combinations are preferred. The first test deals with three color harmonies: (1) monochromatic (shades and tints of one color, i.e., the dark and light values of any particular color); (2) analogous (colors that are close or colors that are side by side on the color wheel, e.g., yellow and green or red and purple); (3) complementary (colors that result in grey when mixed together, that is, colors that are directly opposite in location on the colors wheel). The second test deals with the repetition of color, that is, the achievement of a balanced unit by a simple repeated design. The next test, the third, concerns value. It determines whether children prefer dark colors, light colors, or a combination of dark, light, and intermediate. The last test, the fourth, utilizes value again but this time in the working out of a balanced arrangement. All the tests attempt to ascertain which combinations are most pleasing to children in the various grades and how boys and girls differ as they progress from grade to grade.

Previous research has dealt for the most part with single color preference. Baldwin tested the color pre-

ference of a nine month old child.¹ Michaels tested the color preference of children according to age.² Arlitt and Buchner tested the color preferences of white and Negro children.³ Garth conducted a color study using designs and single colors.⁴ In a test of color reaction of school children Mary Polson tested for value of color as well as for single color preference.⁵ Ann Van Nice Gale tested children for single color preference and for the combinations of colors. She did not test for preference in regard to the three color harmonies but in regard to variations in the complementary color combination and in regard to monochromatic and analogous color schemes.⁶ However, this thesis tests for preference in the three color harmonies: monochromatic, complementary, and analogous.

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1. Baldwin, J. M., Mental development, p. 48-54.
 2. Michaels, G. M., Color preferences according to age, (In American Journal of Psychology, v. 35, p. 79-87, January, 1935).
 3. Arlitt and Buckner, A study of color preferences in white and Negro three year olds, (In Psychological Bulletin, v. 34, p. 190-191, March, 1927).
 4. Garth, T. R., and Porter, E. P., The color preferences of 1,032 young children, (In American Journal of Psychology, v. 46, p. 448-451, July, 1937).
 5. Polson, Mary, Color reaction of school children, (In Journal of Home Economics, v. 18, p. 299-302, June, 1926).
 6. Gale, Ann Van Nice, Children's preference for colors, color combinations and color arrangements.

Munsell's five-color theory was used in this thesis because he has provided a measured color system in place of guess work, this by means of his invention of the photometer which measures the value and intensity of color.⁷ The photometer has enabled him to construct color scales showing the mathematical position of each hue in relation to its value and chroma (intensity).

Munsell has taken the colors that result from light passing through a prism and has adapted them to pigments. Munsell's primary colors are red, green, and blue to which he adds yellow and purple. Other hues are gotten by mixing these basic colors.

The scientific light theory which involves the breaking up of white light into its constituent colors--illustrated by passing white light thru a prism--does not apply to pigments. Pigments in combination will not produce the same results as will the constituent colors of white light. In other words, pigments are material substances, hence somewhat impure, while the constituent colors of white light are rays, which may be considered pure; and the two sets of colors being of different natures will not behave the same.

The Brewster theory of red, blue, and yellow as pri-

7. Munsell, A. H., A color notation, p. 34-48.

mary colors and orange, purple, and green as secondary colors was not used in this thesis because a mixture of these colors does not give a balanced neutrality or a grey but results in a predominance of orange. The fact that a balanced neutrality does not result, and that a greyed orange hue does, indicates that orange does not belong to a basic color set. It should be left out since it is responsible for the above result. Munsell obtains the color orange by mixing yellow and red and calling it yellow-red. When complementary colors are mixed according to the Brewster theory, only a dull colored grey results but when Munsell's complementary colors, which have been measured according to chroma and value, are used, a true grey is obtained.

Although the Brewster theory is most commonly known in this country, Munsell's color harmonies are found in the Orient where the artists and craftsmen have used them to especially good advantage in Persian rugs and Japanese prints. Some of the larger grade schools in America employ the Munsell system in their teaching of art..

One can say this in regard to standards concerning the use of color. There is no standard that determines which of the three color combinations, analogous, complementary, or monochromatic, is the best; this has always been a matter of personal preference. The color Tests here were not devised to set up a standard combination

preferable to others. They were devised merely to find which arrangements were most pleasing to the boys and girls in the various grades and whether there is a difference in their preferences.

Tests II, III, and IV involve the use of art standards. The question is, "Must children learn to conform to adult standards or are their untrained tastes similar to those of an adult who has acquired an appreciation of the acceptable forms?"

Simplicity has always been an art standard. Test II achieves simplicity by a simple repetition of color. The design that involves repetition of colors will therefore have fewer different colors and so will be more simple. Balance here is achieved when color is repeated in more than one area of the design.

Mary Polson in testing a group of children found that children preferred lighter values.⁸ The adult standard is to produce a contrast in value so that one color will enhance the beauty of the other colors.

A well balanced design is supposed to give a feeling of equilibrium and stability. Test IV discovers whether children would prefer a well balanced design to one that was unbalanced. It ascertains whether children possess

8. Polson, Mary, Color reaction of school children, (In Journal of Home Economics, v. 18, p. 299-302, June, 1926).

a natural sense of color balance. The test provides a choice between balanced light and dark colors and unbalanced light and dark colors.

Not much has been done in the field of color study. Some experiments have been conducted; some books have been written; yet no definite conclusions have been drawn. After a careful study of what has been done in the field of color and with the assistance of the art staff of Fort Hays Kansas State College, the tests for this thesis were constructed. These tests went through an experimental stage subject to the reactions of both adults and school children. After several alterations in design and color harmony further refinements were made. When the tests seemed to answer the purpose for which they were intended, they were judged ready for use.

PART II

STRUCTURE OF TESTS

The construction of the Tests played an important part in the thesis. This involved working out the tests in the form of simple designs and color combinations. Each test was broken into several designs, which we will refer to as subtests, and each subtest was in turn broken into three color arrangements, which we will refer to as samples. Test I consisted of five designs or subtests; Tests II, III, and IV consisted of three subtests each. One subtest at a time was given to elementary school children.

After the designs and color combinations were satisfactorily determined they were mounted on 12" x 18" cardboard so that each sample could be seen across the class room and could be judged by the entire group of children.

In each subtest the child was asked to choose one out of the three color combinations. Thus he had three samples to choose from. All three were set before him. The subtests were arranged in alphabetical order so that when the first subtest was removed the children were

confronted with the next one. The samples were supported by hooks which were fastened to wooden boards. These boards were so constructed that they could be placed on the chalk tray of the blackboard in front of the classroom.

As previously stated each subtest was a different design. The subject matter used in each design consisted of objects in which the child is interested.¹ Test I was made up of five subtests, each of which represented a small child. Thus this Test consisted of five child figures as designs. In Tests II, III, and IV, each of which consisted of three subtests, two subtests represented objects familiar to the child, and the third subtest represented an abstract composition. In the three samples of the subtests in Tests II, III, and IV, one sample showed a correct color combination and the other two samples showed incorrect combinations; in other words, two samples were defective. Correctness and defectiveness in these samples are based upon accepted artistic standards. The child chose the one of the three samples that most appealed to him. For each Test the various subtests were so worked out as to allow equal areas apportioned to identical colors and so as to use

1. Tomlinson, R. R., Picture making by children, p. 18

the same colors in each subtest. Thus while the pattern of one subtest differed from another, the areas allotted to identical colors were the same, and the colors in one subtest were identical with those in another. A test was split up into different designs (subtests) in order to note whether different designs might influence a child's choice and in order to provide a larger array of possibilities from which to choose.

Munsell's colors were used because Munsell is an accepted authority on color. His color system of values and chromas (or intensities) is logically and accurately developed. Each value and chroma can easily be distinguished because it has been so well placed and described.

In Test I, which tests the children's choice of color harmonies, each subtest--A, B, C, D, and E--represents one of Munsell's five basic colors: red, yellow, green, blue, and violet. Each subtest contains three samples showing the three harmonies of each color. The basic color was used in a middle tone so that the colors would harmonize with the various soft color schemes used, namely, complementary, monochromatic, and analogous. With the basic colors were combined a lighter value, this being the harmonizing color. In each sample and in each subtest of Test I the light and dark colors have the same value and chroma, these taken from Munsell's color chart. (Figure I)

FIGURE 1. TEST I COLOR HARMONY
continued on next page

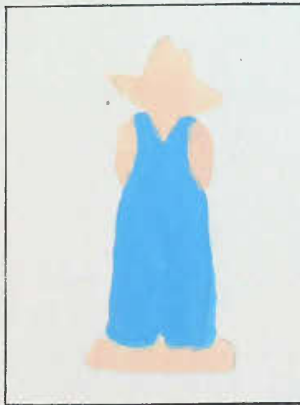
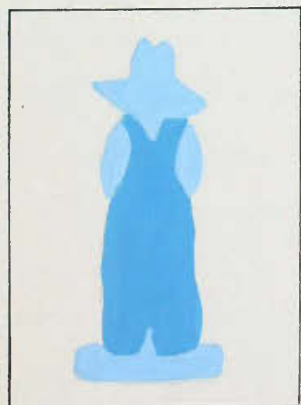
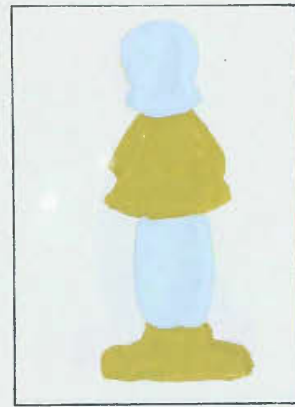
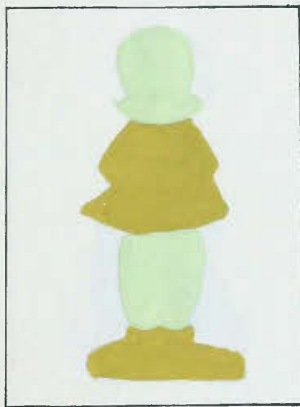
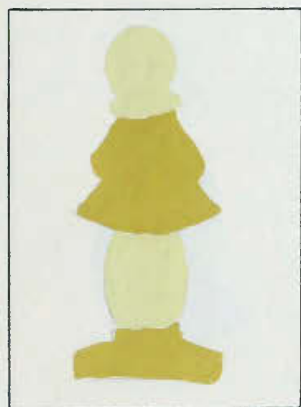
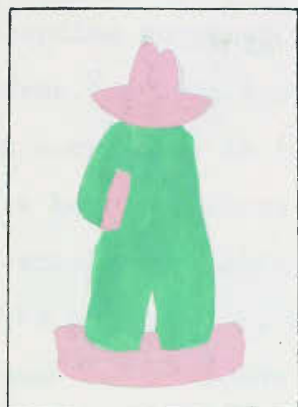


FIGURE 1. TEST 1 COLOR HARMONY (continued)



Test II tests for simplicity and balance by means of repetition of color. Red was chosen as the predominating color since, according to previous tests, red is a favorite among children.² This test is based upon the hypothesis that when each color is repeated in different areas of the design a better balance is achieved and the design will be more simple and unified. One sample of each subtest shows the basic color, red, with a variety of colors. The second sample shows the same basic color with a variety of colors, except that one color is repeated. The third sample shows the basic color repeated and also its complement, blue-green, which is repeated in the same value and also in a lighter value. A different design was used in each subtest while the design of the sample in each subtest remained the same. The design of subtest F is a calf, subtest G a small boy, and subtest H an abstract arrangement. (Figure 2)

The third Test, made up of subtests I, J, K, is a test of color value. It attempts to find whether children prefer light colors, dark colors, or a combination of light, dark, and medium colors. A greyed color was used so that children would not be influenced in their

2. Garth, T. R., and Porter, E. P., The color preferences of 1,032 young children, (In American Journal of Psychology, v. 46, p. 448-451, July, 1937).

FIGURE 2. TEST 11 COLOR REPETITION



choice by the intensity of a color. As previous experiments show, children tend to choose the very bright designs when these are contrasted with light or subdued designs.³ In each subtest the design of one sample is in light color values, another in dark color values, and the third in a combination of light, dark, and medium color values. The designs of Tests I, J, K, are an abstract form, a house, and a camel. (Figure 3)

Test IV is divided into subtests L, M, N, which are tests of color balance by means of value. An analogous color scheme was used since neighboring colors are somewhat similar and since children would not be influenced by a change in value of the colors. The balance was worked out in a simple bilateral design. One of the samples is heavy on the right side, that is, the right side is composed of dark values. Another sample has a light right side and a heavy or dark left side. In the third sample there is a balance of values. These color combinations were carried out in the three subtests. Subtest L is an abstract design, subtest M represents two ducks, and subtest N portrays a boy and a girl. (Figure 4)

The Tests were given to 403 boys and 436 girls making a total of 899. The children came from grades

3. Gale, Ann Van Nice, Children's preference for colors, color combinations and color arrangements, p. 55.

FIGURE 3. TEST III COLOR VALUE



FIGURE 4. TEST IV COLOR BALANCE



one to six inclusive and were taken from three different schools. None of the children had had special art training so that all were on the same level of art appreciation and understanding as far as academic education is concerned.

The choices were recorded by giving each child a paper card on which was mimeographed vertically the alphabet from A to N inclusive representing the subtests. Horizontal to each letter were the numbers 1, 2, 3, which corresponded to the sample of each subtest. The child merely encircled the number in each subtest which corresponded to the sample of each subtest that he preferred. The words boy, girl, and grade followed by a line headed the card. (Table 6)

The directions given to the children at the time of testing were made very simple. The children were asked to put the number of their grade in the upper margin and to underline the word boy if they were boys or to underline the word girl if they were girls. They were then asked to follow each subtest closely and to encircle the number that corresponded to the number in the picture that they "liked the best". In grades one, two, and three a demonstration was given on the blackboard. Care was taken that the first choice of the tester in the explanation was sample number two of subtest A so that if her choice would influence the group it could be noted in the

results. However, this influence did not occur. Each Test was exposed to the children two or three minutes or somewhat longer, until all were ready for the next set of pictures.

In all the grades the children were enthusiastic in showing their appreciation of the various designs and colors. The lower grades were especially interested in each new design.

Figures 1, 2, 3, and 4 depict the four Tests. Figure 5 shows the preference of boys as compared with girls for the different color combinations in the various Tests. Figure 6 shows total preferences of children in the various Tests. Figures 7, 8, 9, and 10 show a comparison of the grades in their preferences. The bar charts, Figures 11, 12, 13, and 14 compare the preferences of the boys with those of the girls in the different grades. In the working out of the results of these Tests, the choices of the children were tabulated from the individual paper cards on which the choices had been registered.

The choices of each grade were tabulated separately for each Test. The choices of the boys and girls were kept distinct in a like manner.

The choice totals for each Test were then figured. Since each subtest involved three possibilities of selection, there were three choice totals, each total rep-

representing the actual number of choices made for each possibility. There was one choice for every child in each subtest. Thus a choice total was arrived at by adding up the single choices in each subtest that went for the same possibility.

In the first Test there were five subtests and one choice for each subtest. Each child had five choices for the first Test. Let us take the boys in the sixth grade as an example of the calculation procedure. Since there were a total of 94 boys in the sixth grade and each boy had five choices there was a total of 470 choices. Out of the total of 470 choices 269 were made for the complementary shade. Or stated in percentage terms 57.2% of the choices went for the complementary color combination. 172 choices out of the total of 470 were for the monochromatic color combination. 89 choices went for the analogous color sample making the proportion of 18.9% for this combination. This is shown in Table 2.

In Tests II, III, IV only three subtests were given. Thus in Test II for the 94 sixth grade boys there was a total of 282 possible choices. There were 101 choices for repetition of one color, 76 choices for repetition of two colors, and 105 choices for no repetition of color. The percentages of choices here were as follows: 35.8% for one repetition, 26.9% for two repetition, and 37.2% for no repetition. (Tables 3, 4, and 5)

PART III

FINDINGS AND CONCLUSIONS

In all four tests there was a decided preference for one certain color combination except in Test II where there is only a difference of .6% for the pattern having a repetition of colors over the pattern having a variety of colors and no repetition. The most acceptable pattern according to art standards received the lowest percentage of choices.

Test I concerns the child's simple and direct preference; it does not involve art standards against which this preference may be compared. Tests II, III, and IV are based upon art standards. In these tests the children's choices can be compared with those that are considered the most acceptable choices.

There was no great variation in the choices of the children from the three different schools. The children were consistent from school to school in their choices for the different color combinations.

The children were also found to be consistent in their choice of color regardless of design (subtest). Since each subtest of each test was a different design,

the findings were checked to see whether the children might have been influenced by the subject matter of the various designs. The check-up showed that the children did not especially favor any particular color because of the design in which it appeared. Their choices in the main were consistent from design to design.

This is how the most acceptable choices ranked in the three Tests. Test II: the simplest pattern with a good balance and a repetition of two colors received the lowest percentage of choices made by both boys and girls. Test III: the pattern involving the light, dark, and medium color value ranked second in percentage of choices. Test IV: the balanced design had the lowest percentage of choices among the boys.

In terms of percentage the percentages representing the boys' preferences do not vary one from the other as much as do those representing the girls' preferences. The girls' percentages are somewhat more extreme than those of the boys, that is, their high percentages are higher and their low percentages lower than are those of the boys. The boys in their choices come closer to the accepted forms than do the girls. (Figure 5)

In Test I 57.2% of the choices were for complementary colors. 22.7% of the choices were for the monochromatic color scheme and 20.1% of the choices were for the analogous color scheme. (Figure 6) This test shows a decided

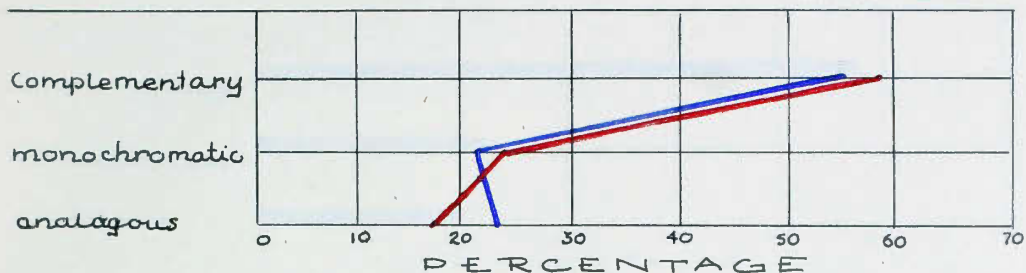
FIGURE 5

Showing percentage of choices registered by boys and girls for each test.

TEST I

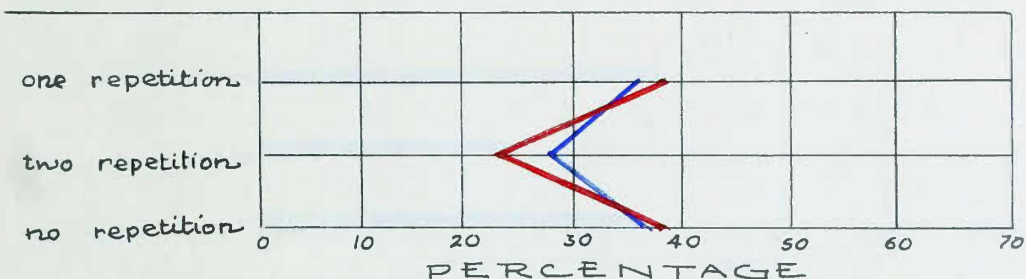
COLOR HARMONY

BOYS
GIRLS



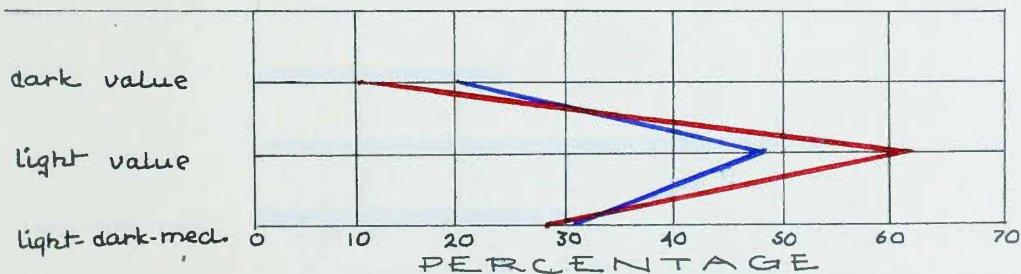
TEST II

COLOR REPETITION



TEST III

COLOR VALUE



TEST IV

COLOR BALANCE

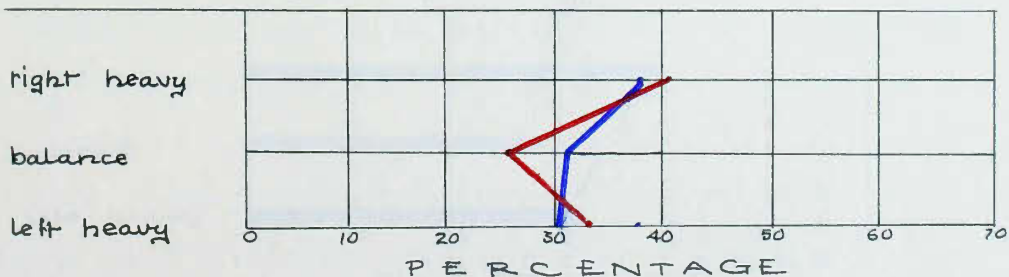
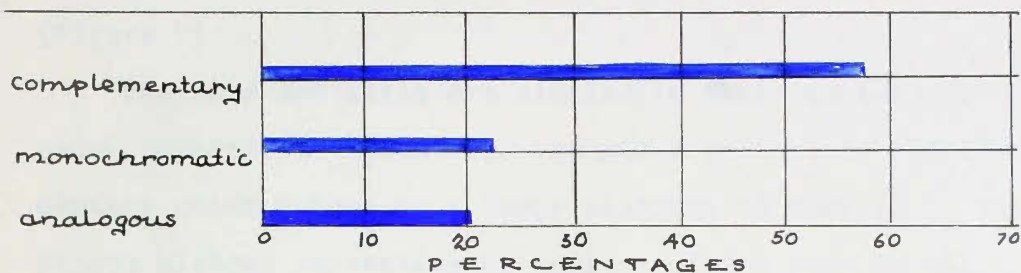


FIGURE 6. Showing percentage of choices registered by children for each Test.

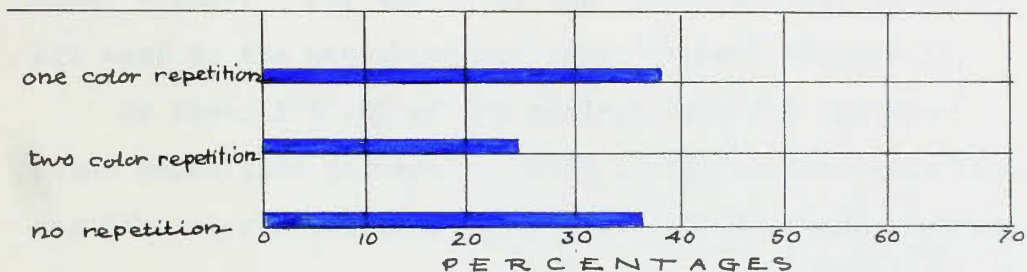
TEST I

COLOR HARMONY



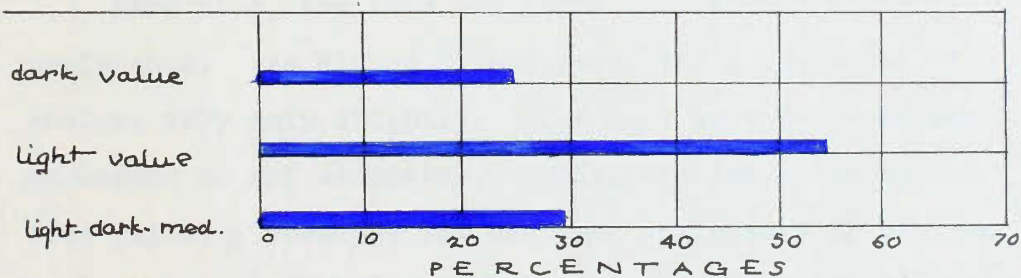
TEST II

COLOR REPETITION



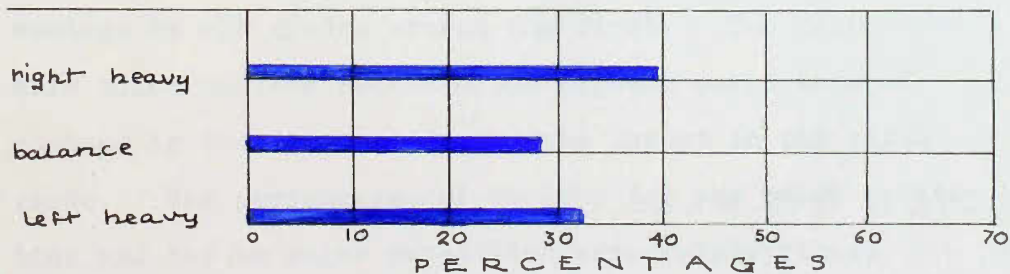
TEST III

COLOR VALUE



TEST IV

COLOR BALANCE



preference for a complementary color scheme in all grades. (Figure 7)

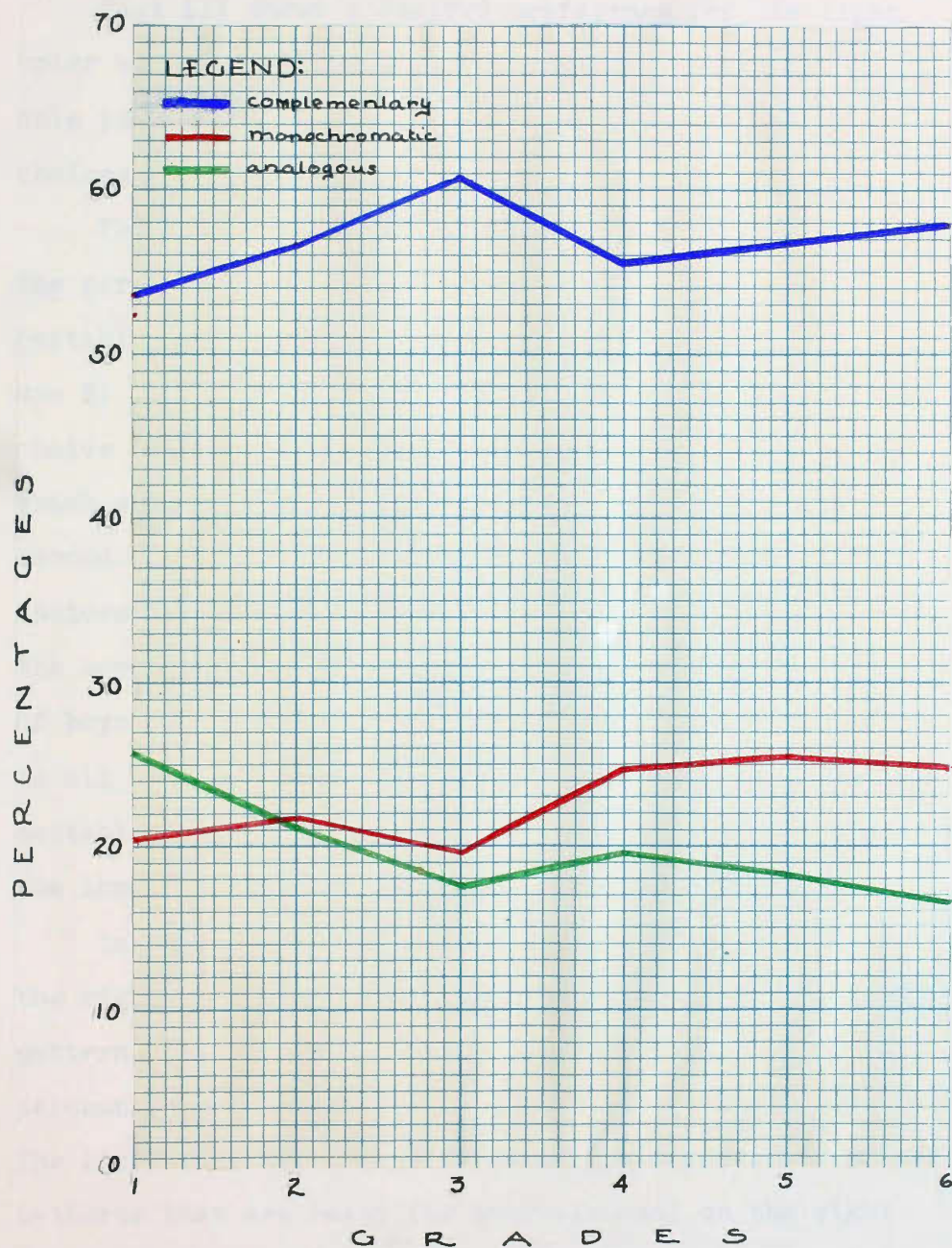
The boys and girls are similar in their choices of color harmonies. Both boys and girls prefer the complementary color scheme by a large majority of choices. The second highest percentage of choices of the boys in all grades except the fifth and sixth went for the analogous color scheme. For the girls the second highest percentage went to the monochromatic color scheme. (Figure 11)

In Test II 37.5% of the choices were for the one-color repetition pattern. 25.6% of the choices were for the two-color repetition pattern and 36.9% of the choices were for a variety of colors and no repetition. (Figure 6) This Test shows no majority for any one color combination.

Here also, the boys and girls show a similarity of preference. As Figure 5 indicates, the percentages of choices vary only slightly. The most acceptable pattern according to art standards, namely, the two-color repetition pattern, received the smallest percentage of choices by both boys and girls. The boys' percentage for the two-color repetition pattern ranked higher than the girls' percentage in all grades except the first. The most acceptable color pattern received the highest percentage of choices in the first grade and the lowest in the sixth grade. The percentages of choices for one color repetition and for no color repetition were fairly close;

FIGURE 7. TEST I COLOR PREFERENCE

Showing percentage of choices registered for each of three color harmonies by children of grades one to six



the percentages of choices for two color repetition ranked consistently below these figures. (Figure 8)

Test III shows a decided preference for the light color values in all grades. (Figure 9) The most acceptable pattern received the second highest percentage of choices.

The boys and girls are similar in their choices. The percentage of choices of the boys for the most acceptable pattern is higher than that of the girls. (Figure 5) Figure 13 shows that boys lead the girls in the choice for the light, dark, and medium color patterns, which are the most acceptable, in all grades except the second. Figure 13 also shows that the percentage of choices of girls for light values is higher than that of the boys in all grades, while the percentage of choices of boys for dark values is higher than that of the girls in all grades. The highest percentage for the most acceptable pattern is in the fifth and sixth grades while the lowest percentage is in the first grade. (Figure 9)

In Test IV all children prefer the pattern showing the right hand side heavy instead of the most acceptable pattern, the balanced pattern, which received the lowest percentage of choices in all grades except the sixth. The girls show the highest percentage of choices for the patterns that are heavy (or overbalanced) on the right hand side and the lowest percentage of choices for the

FIGURE 8. TEST II COLOR REPETITION

Showing percentage of choices registered for each of three color combinations by children of grades one to six

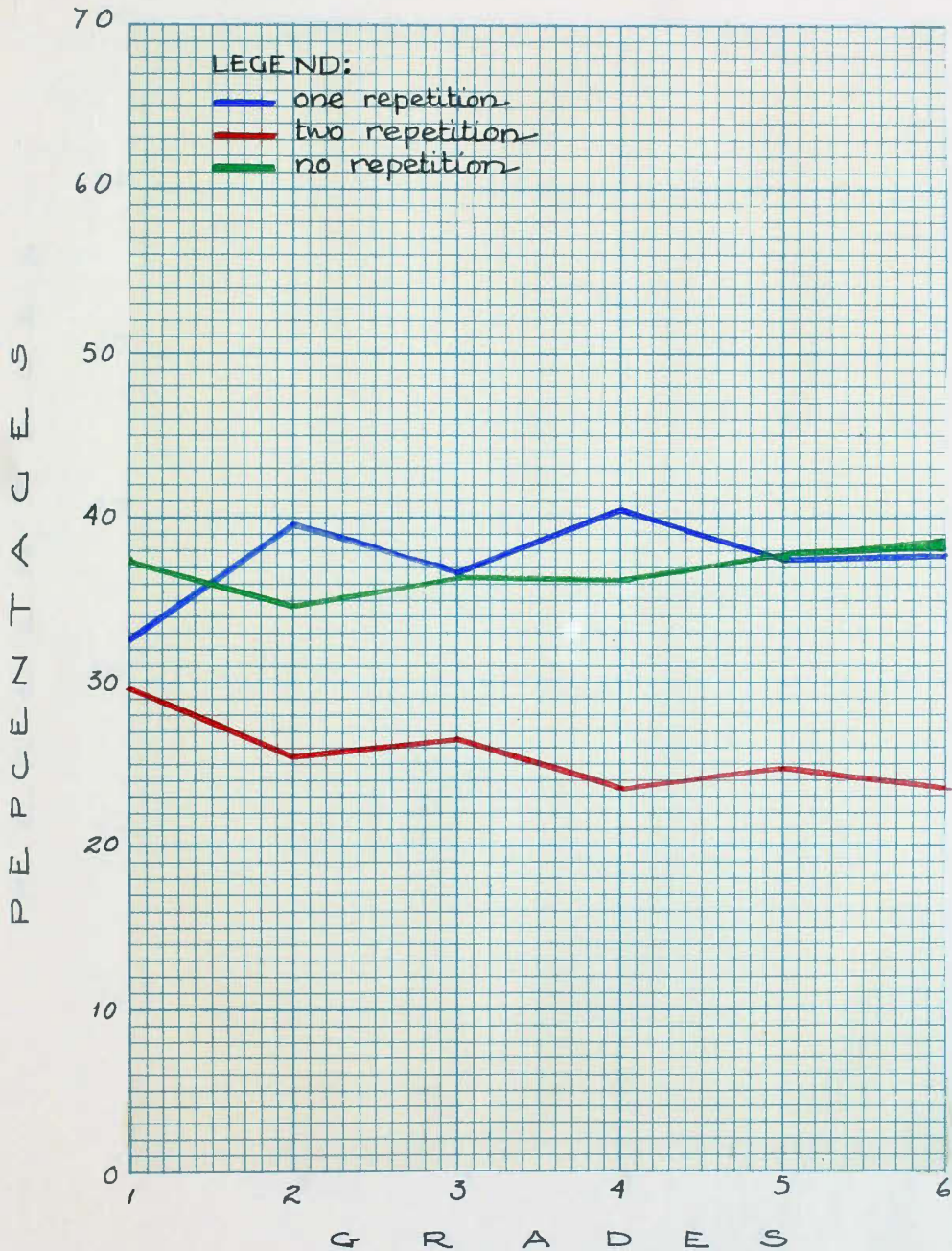
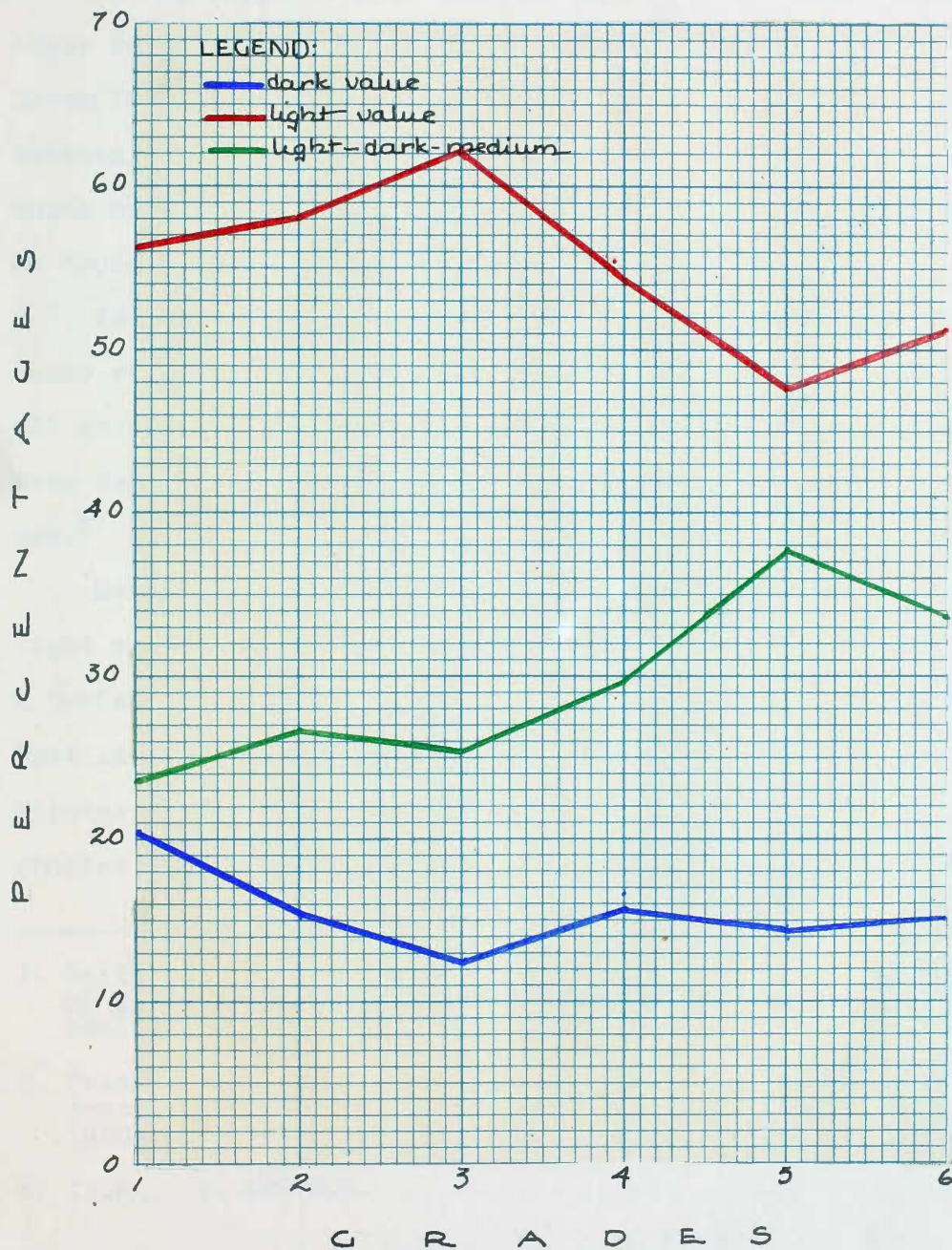


FIGURE 9. TEST III. COLOR VALUE

Showing percentage of choices registered for each of three color combinations by children of grades one to six.



balanced pattern. (Figure 5)

In the comparison of the findings of these tests with other tests some likenesses and differences are noted. Garth found that boys on the whole can better discriminate between colors than girls.¹ In Tests II, III, and IV, which have the most acceptable forms, the boys came closer to choosing the correct forms than the girls.

Test IV (Figure 10) shows that the balanced design in color value is least preferred by both boys and girls in all grades except the sixth. Mary Polson found that children had little feeling for balance of dark and light values.²

Mary Polson also found that young children preferred light values but as age increased many boys began to show a preference for dark values.³ Test III (Figure 13) shows that light values are preferred by both boys and girls. Figures 5 and 13 show that a higher percentage of boys' choices went for dark values than did that of girls' choices.

1. Garth, T. R., and Porter, E. P., The color preferences of 1,032 young children, (In American Journal of Psychology, v. 46, p. 448-451, July, 1937).

2. Polson, Mary, Color reaction of school children, (In Journal of Home Economics, v. 18, p. 299-302, June, 1926).

3. Ibid., p. 299-302.

But, contrary to Miss Polson's findings, Figure 13 does not show that preference for dark values increases with age.

Gale in her tests on color preferences found that monochromatic color harmonies were preferred in the third grade and analogous colors were preferred in all other grades.⁴ Test I (Figure 7) shows that a monochromatic color scheme was preferred in all grades except the first.

4. Gale, Ann Van Nice, Children's preference for colors, color combinations and color arrangements, p. 55.

FIGURE 10. TEST IV. COLOR BALANCE

Showing percentage of choices registered for each of three color combinations by children of grades one to six.

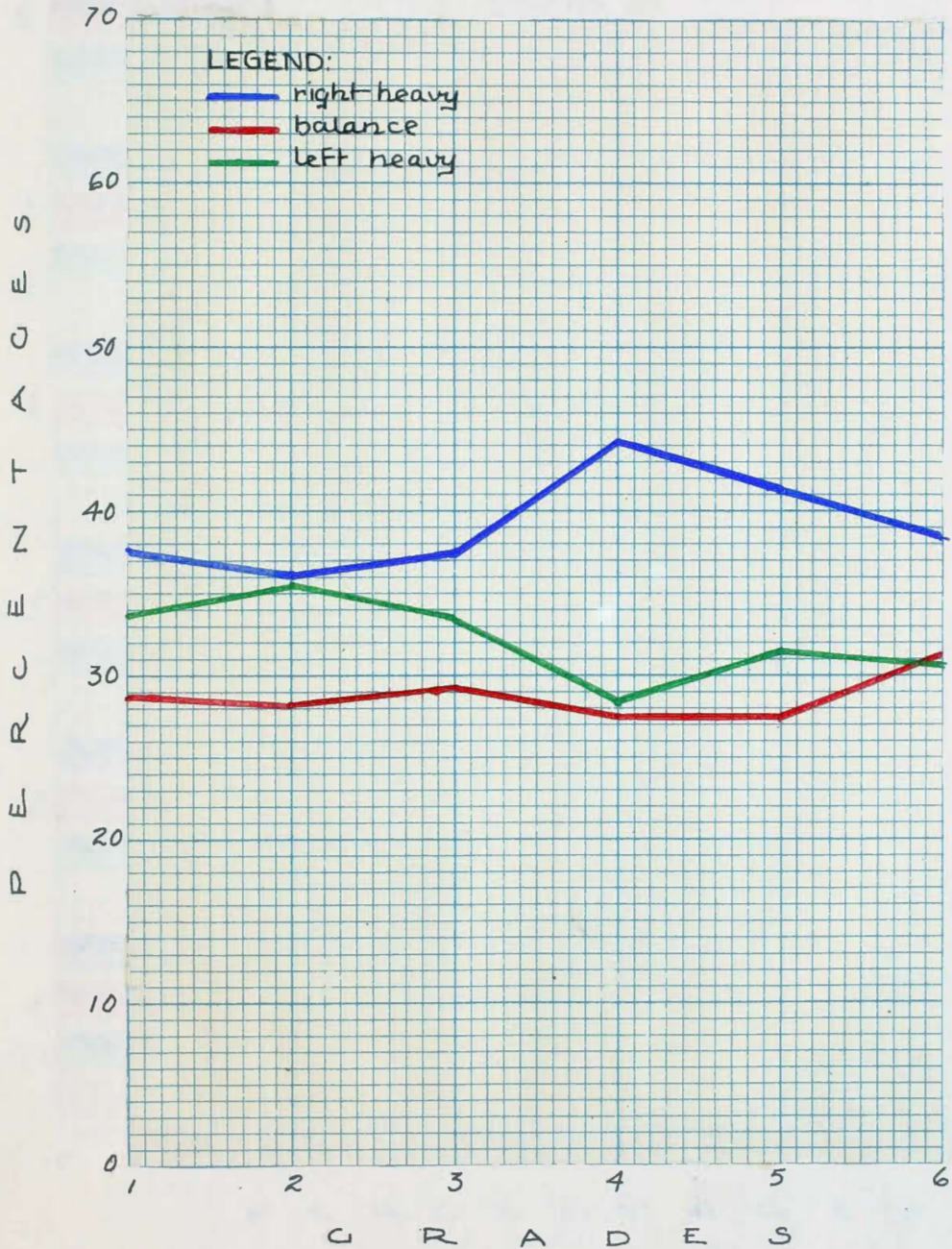


FIGURE 11. TEST I COLOR HARMONIES
 Showing percentage of choices registered for each of three color harmonies by boys and girls separately of grades one to six.

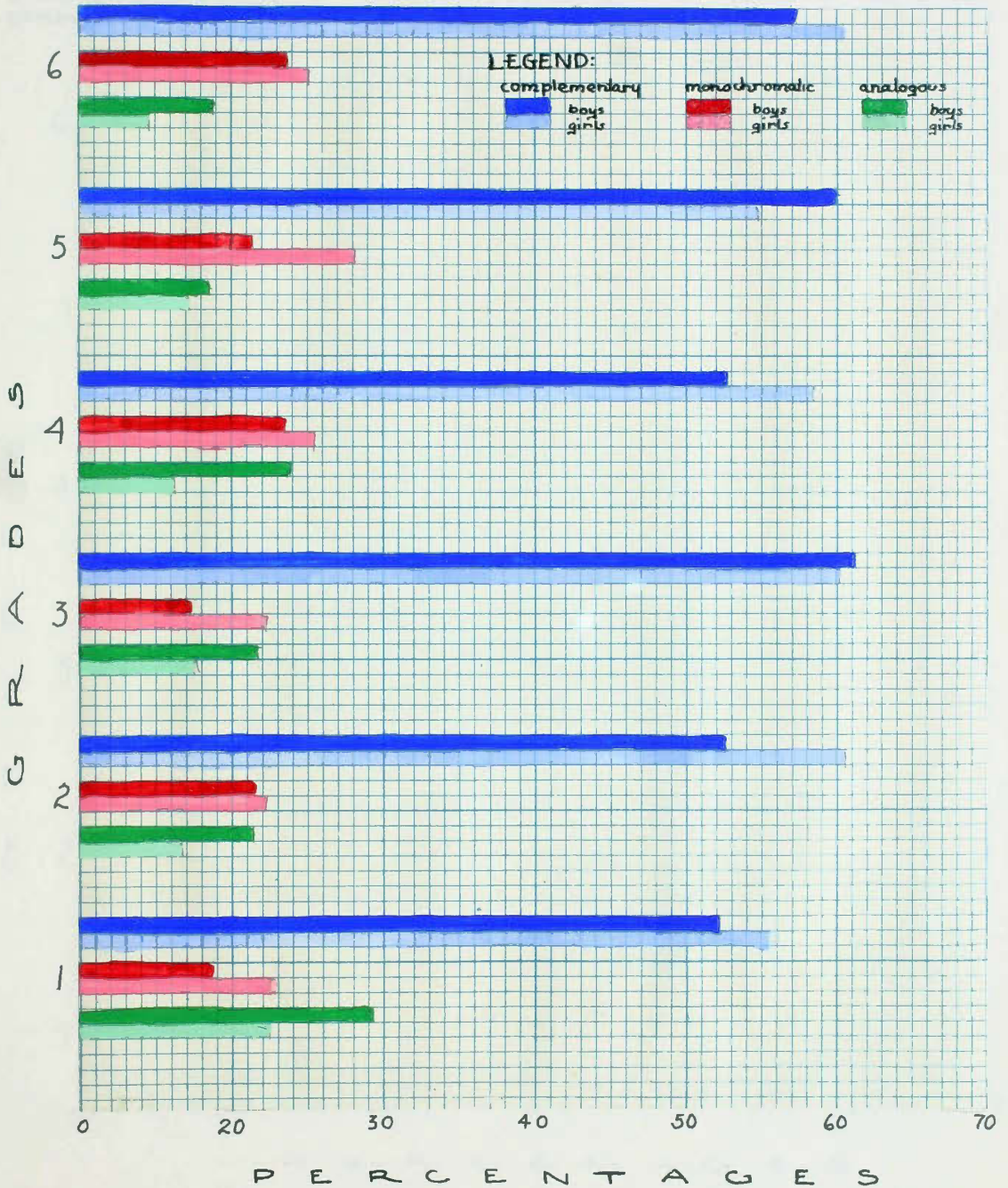


FIGURE 12 TEST II COLOR REPETITION

Showing percentage of choices registered for each of three color combinations by boys and girls separately of grades one to six.

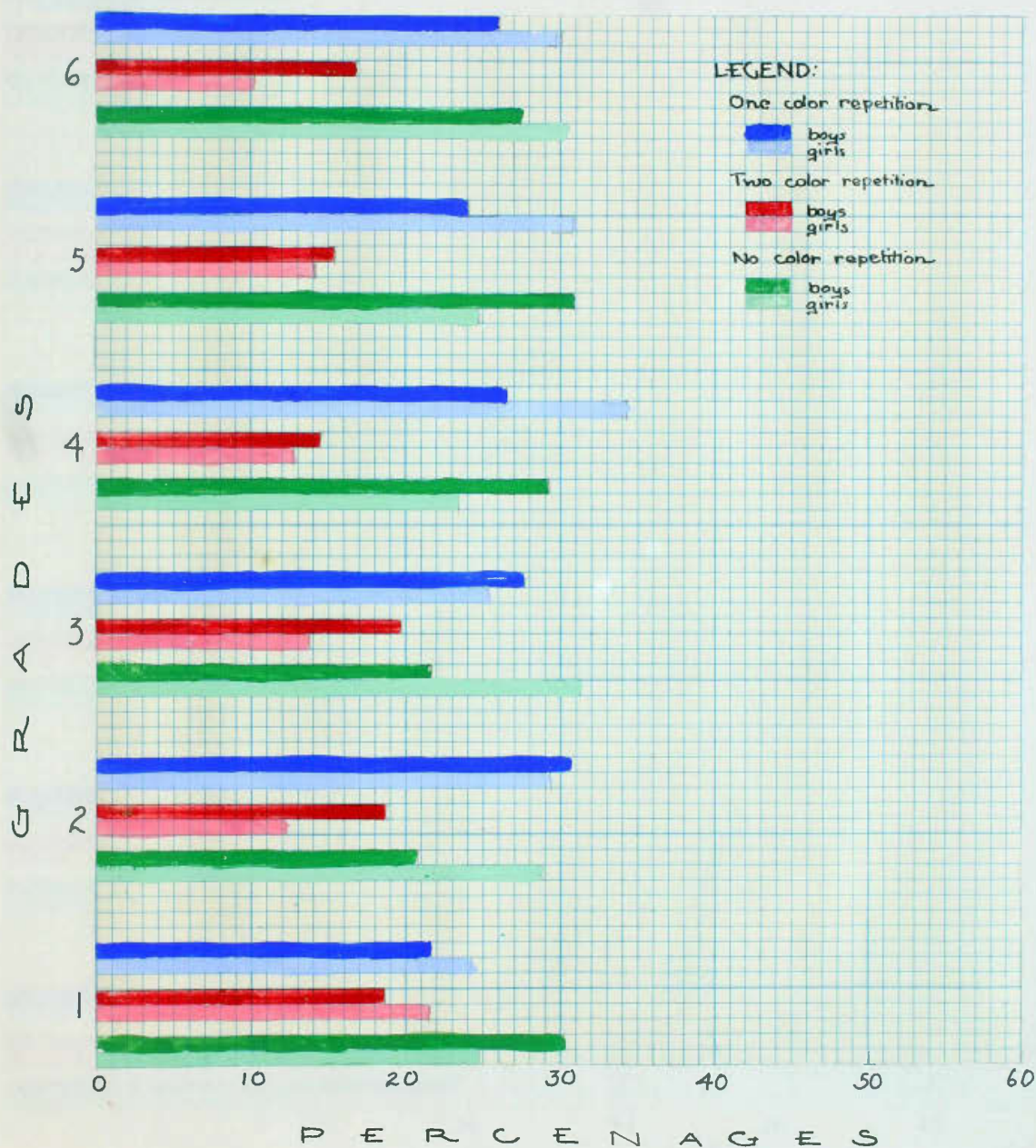


FIGURE 13 TEST III COLOR VALUE

Showing percentage of choices registered for each of three color combinations by boys and girls separately of grades one to six.

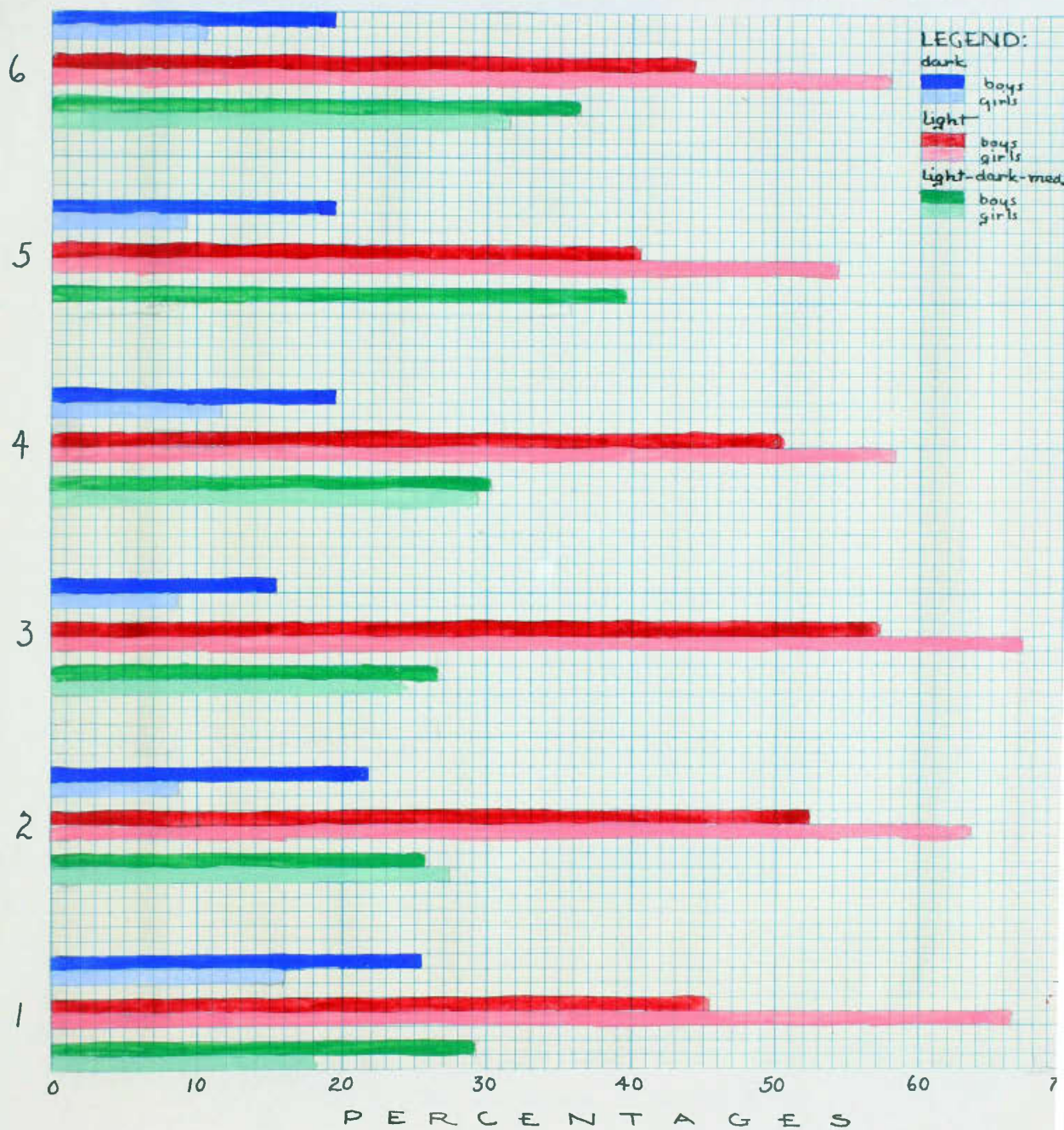
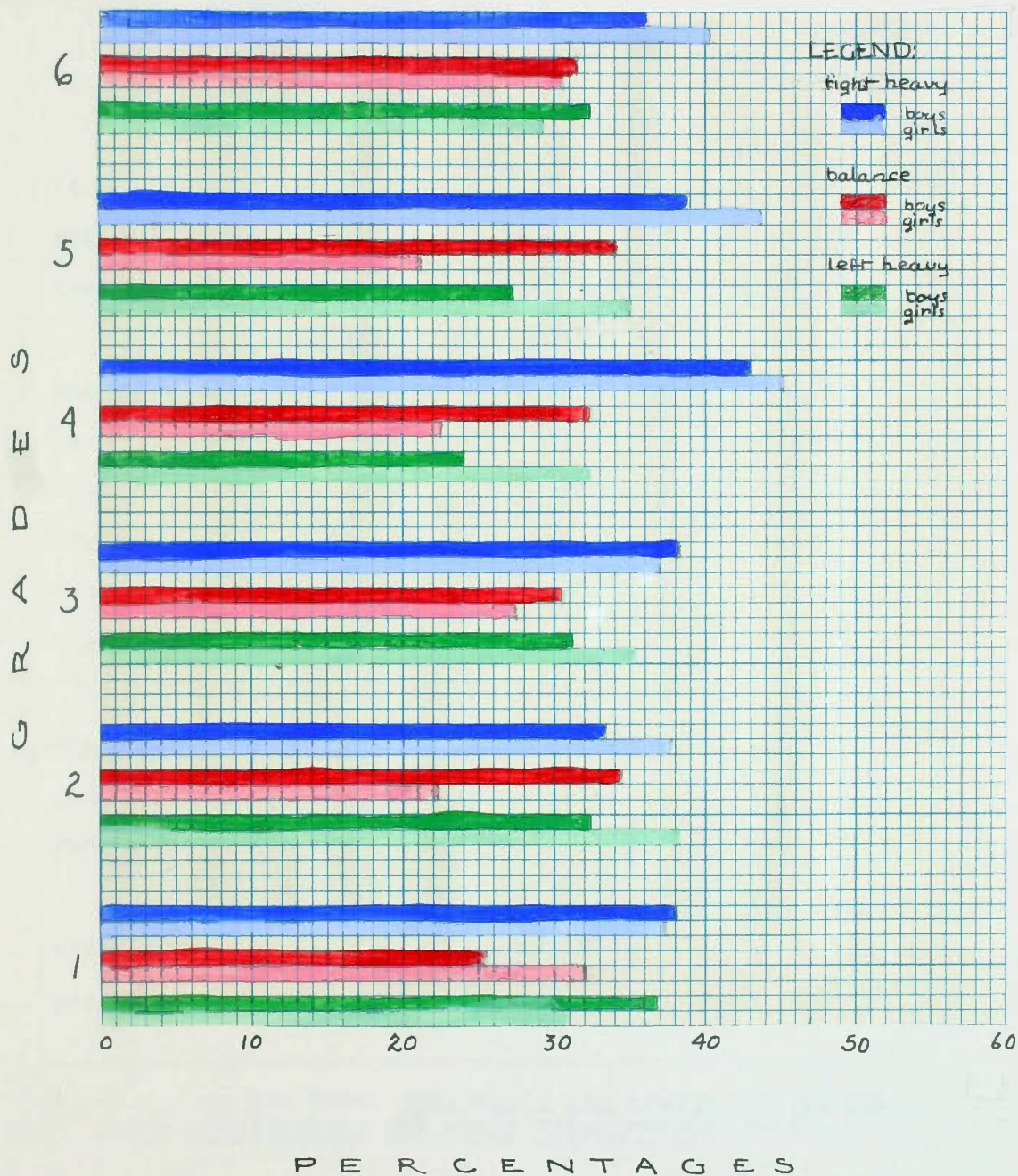


FIGURE 14. TEST IV COLOR BALANCE

Showing percentage of choices registered for each of three color combinations by boys and girls of grades one to six.



S U M M A R Y

It was the purpose of this thesis to study the growth of color discrimination in school children. Do elementary school children develop a sense of color discrimination in the early grades? If so, to what extent and at what rate?

The conclusion may be made that there is no growth of color discrimination from year to year. Gale explained the lack of growth in color sense by saying that "either children's experience with color in the grades was not strong enough to effect a change in preference, or children's innate preferences for color are not capable of being changed during that period".¹

The children's preferences may be summarized in this way. They prefer: (1) complementary color harmonies; (2) many-color designs rather than designs having simple color repetition; (3) light values; (4) poorly balanced designs.

Boys have a slightly better sense of color discrimination than girls; are more conservative in their preferences, not being quite as extreme; choose darker values;

1. Gale, Ann Van Nice, Children's preference for colors, color combinations and color arrangements, p. 26.

have a slightly better sense of balance.

Children are consistent in their color choices regardless of changes in design.

Children do not have a natural sense of proper or correct color patterns, that is, they do not prefer those color patterns deemed best according to adult artistic standards. Apparently, proper appreciation and good taste in color arrangements are acquired traits rather than innate traits.

TABLE I. SHOWING PERCENTAGE OF CHOICES REGISTERED FOR EACH TEST BY TOTAL CHILDREN

TEST I	BOYS	GIRLS	TOTAL
COMPLEMENTARY	55.7	58.6	57.2
MONOCHROMATIC	21.3	24.2	22.7
ANALOGOUS	23.1	17.3	20.1
TEST II			
ONE COLOR REPETITION	36.1	38.9	37.5
TWO COLOR REPETITION	27.3	24.0	25.6
NO COLOR REPETITION	36.6	37.1	36.9
TEST III			
DARK VALUE	20.3	10.9	15.5
LIGHT VALUE	48.4	61.4	54.9
LIGHT-DARK-MIDDLE	31.3	27.6	29.5
TEST IV			
RIGHT HEAVY	38.1	40.4	39.2
BALANCE	31.3	26.0	28.7
LEFT HEAVY	30.6	33.6	32.1

TABLE II SHOWING CHOICES MADE FOR TEST I
BY CHILDREN IN ALL GRADES

GRADE	NUMBER OF CHILDREN	NO. OF CHOICES	COM- PLEMENT- ARY	MONO- CHROMATIC	ANAL- OGOUS	PERCENTAGE OF CHOICES FOR		
						COM- PLEMENTARY	MONO- CHROMATIC	ANAL- OGOUS
SIXTH								
BOYS	94	470	269	112	89	57.2	23.9	18.9
GIRLS	73	365	221	92	52	60.5	25.2	14.3
TOTAL	167	835	490	205	141	58.8	24.6	16.6
FIFTH								
BOYS	107	485	291	102	92	60.0	21.3	18.7
GIRLS	79	395	217	111	67	54.9	28.1	17.0
TOTAL	176	880	508	213	159	57.5	24.7	17.8
FOURTH								
BOYS	75	375	97	88	90	52.5	23.5	24.0
GIRLS	84	420	245	108	67	58.3	25.7	16.0
TOTAL	159	795	442	196	157	55.6	24.7	19.7
THIRD								
BOYS	75	375	229	64	82	61.1	17.1	21.8
GIRLS	82	410	247	91	72	60.2	22.2	17.6
TOTAL	157	785	476	155	154	60.7	19.6	19.7
SECOND								
BOYS	67	335	177	72	86	52.9	21.5	25.4
GIRLS	68	340	206	77	57	60.6	22.4	16.7
TOTAL	125	675	383	149	143	56.8	21.9	21.1
FIRST								
BOYS	55	275	144	51	80	52.4	18.6	29.1
GIRLS	50	250	138	55	57	56.1	22.4	22.6
TOTAL	105	525	282	106	135	54.2	20.2	25.7

TABLE III. SHOWING CHOICES MADE FOR TEST II
BY CHILDREN IN ALL GRADES

GRADE	NUMBER OF CHILDREN	NO. OF CHOICES	ONE REPETITION	THREE REPETITION	NO REPETITION	PERCENTAGE OF CHOICES		
						ONE REPETITION	THREE REPETITION	NO REPETITION
SIXTH								
	BOYS 94	282	101	76	105	35.8	26.9	37.2
	GIRLS 73	219	87	44	88	39.7	20.1	40.2
	TOTAL 167	501	188	120	193	37.8	23.5	38.7
FIFTH								
	BOYS 97	291	99	73	119	34.0	25.1	40.9
	GIRLS 79	237	97	58	82	40.9	24.5	34.6
	TOTAL 176	528	196	131	201	37.5	24.8	37.7
FOURTH								
	BOYS 75	225	82	55	88	36.5	24.4	39.1
	GIRLS 84	252	111	57	84	44.1	22.6	33.3
	TOTAL 159	477	193	112	172	40.3	23.5	36.2
THIRD								
	BOYS 75	225	87	67	71	38.6	29.8	31.6
	GIRLS 82	246	87	58	101	35.3	23.6	41.1
	TOTAL 157	471	174	125	172	36.7	26.7	36.5
SECOND								
	BOYS 67	201	81	58	62	40.3	28.9	30.8
	GIRLS 68	204	80	45	79	39.2	22.1	38.7
	TOTAL 135	405	161	103	141	39.8	25.5	34.7
FIRST								
	BOYS 55	165	52	47	66	31.5	28.5	40.0
	GIRLS 50	150	51	47	52	34.0	31.3	34.7
	TOTAL 105	315	103	94	118	32.8	29.9	37.3

TABLE IV. SHOWING CHOICES MADE FOR TEST III
BY CHILDREN IN ALL GRADES

GRADE	NUMBER OF CHILDREN	NO. OF CHOICES	DARK VALUE	LIGHT VALUE	LIGHT-DARK MEDIUM	PERCENTAGE OF CHOICES FOR			
						DARK	LIGHT	LIGHT-DARK- MEDIUM	
SIXTH									
	BOYS	94	282	55	125	102	19.5	44.3	36.2
	GIRLS	73	219	23	127	69	10.5	58.0	31.5
	TOTAL	167	501	78	252	171	15.0	51.2	33.8
FIFTH									
	BOYS	97	291	57	118	116	19.6	40.6	39.8
	GIRLS	79	237	22	130	85	9.2	54.4	35.9
	TOTAL	176	528	79	248	201	14.4	47.5	37.9
FOURTH									
	BOYS	75	225	44	113	68	19.6	50.2	30.2
	GIRLS	84	252	30	147	75	11.8	58.3	29.4
	TOTAL	159	477	74	260	143	15.8	54.3	29.8
THIRD									
	BOYS	75	225	36	129	60	15.6	57.3	26.6
	GIRLS	82	246	22	165	59	8.9	67.1	24.0
	TOTAL	157	471	58	294	119	12.3	62.2	25.3
SECOND									
	BOYS	67	201	43	105	53	21.8	52.3	25.9
	GIRLS	68	204	18	130	56	8.8	63.7	27.4
	TOTAL	125	405	61	235	109	15.3	58.0	26.7
FIRST									
	BOYS	55	165	42	75	48	25.4	45.5	29.1
	GIRLS	50	150	24	99	27	16.0	66.6	18.0
	TOTAL	105	315	66	174	75	20.2	56.1	23.6

TABLE V. SHOWING CHOICES MADE FOR TEST IV
BY CHILDREN IN ALL GRADES

GRADE	NUMBER OF CHILDREN	NO. OF CHOICES	RIGHT HEAVY	BALANCE	LEFT HEAVY	PERCENTAGE OF CHOICES		
						RIGHT HEAVY	BALANCE	LEFT HEAVY
SIXTH								
BOYS	94	282	102	89	91	36.2	31.5	32.3
GIRLS	73	219	88	67	64	40.2	30.6	29.2
TOTAL	167	501	190	156	155	38.2	31.1	30.7
FIFTH								
BOYS	97	291	113	99	79	38.9	34.0	27.1
GIRLS	79	237	104	50	83	43.9	21.1	35.0
TOTAL	176	528	217	149	162	41.4	27.5	31.1
FOURTH								
BOYS	75	225	98	73	54	43.6	32.4	24.0
GIRLS	84	252	114	57	81	45.2	22.6	32.2
TOTAL	159	477	212	130	135	44.4	27.5	28.1
THIRD								
BOYS	75	225	86	69	70	38.2	30.7	31.1
GIRLS	82	246	91	68	87	37.0	27.6	35.4
TOTAL	157	471	177	137	157	37.6	29.1	33.3
SECOND								
BOYS	67	201	67	69	65	33.4	34.2	32.3
GIRLS	68	204	79	45	80	38.7	22.1	39.2
TOTAL	135	405	146	114	145	36.1	28.2	35.7
FIRST								
BOYS	55	165	63	42	60	38.1	25.3	36.9
GIRLS	50	150	56	41	46	37.3	32.0	30.7
TOTAL	105	315	119	90	106	37.7	28.7	33.8

TABLE VI INDIVIDUAL SCORE CARDS

	Grade _____			Boy
				Girl
I.				
A.	1	2	3	
B.	1	2	3	
C.	1	2	3	
D.	1	2	3	
E.	1	2	3	
F.	1	2	3	
G.	1	2	3	
H.	1	2	3	
I.	1	2	3	
J.	1	2	3	
K.	1	2	3	
L.	1	2	3	
M.	1	2	3	
N.	1	2	3	

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A good source for teachers and artists for instruction in the use of line, mass, and color in composition.

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A study of single color preferences, preferences for a variation of the complementary color scheme, and a preference for monochromatic and analogous colors.

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A test book in color for art departments of secondary schools and colleges.

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A study of children's drawings, with illustrative examples of children's work.

Winslow, Arthur. The integrated school art program. New York, McGraw-Hill Book Co., Inc., 1939. 391 p.

A good book for elementary art teachers. The book describes the color studies to be carried on in the school.