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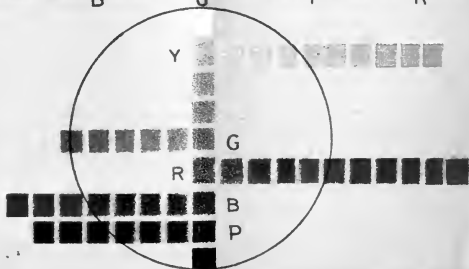
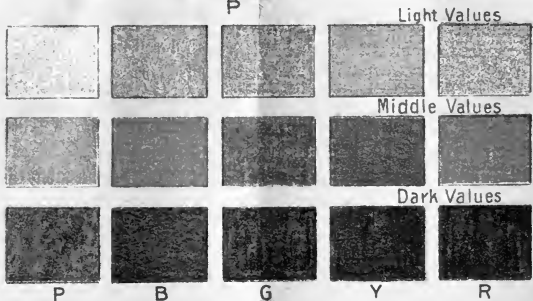
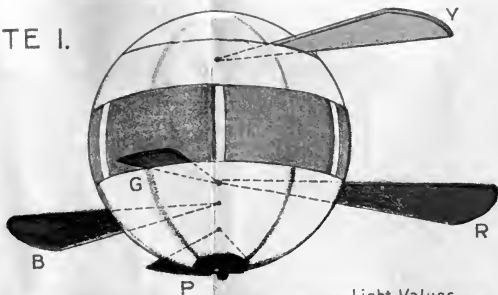
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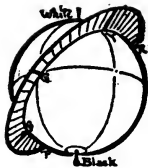
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PLATE I.





COLOR BALANCE ILLUSTRATED

AN INTRODUCTION TO
THE MUNSELL SYSTEM

BOSTON
PRESS OF GEO. H. ELLIS CO.
1913

FOREWORD.

This brief introduction refers by many a foot-note to more complete statements in a larger book, giving a detailed account of the system, with reproductions of beautiful work in measured color, which children have made in the graded course of study.*

Beauty of color flows from balance and measure. Tempered sensations—not extremes—are the source of refined pleasure, and in this system the crude extremes of red, yellow, and blue which make the bill-poster hideous are replaced by those moderate degrees of color which abound in the best decorative and fine art. Later, when the principle of balance is well understood, the measured charts of the Atlas † teach the proportion by which small accents of strongest color may balance large fields of quiet chroma. A color sense thus trained by accurate scales instead of the prevalent guesswork, develops fine discriminations.

These model lessons have been tested by teachers of long experience, and when accompanied by the Color Sphere, Color Tree, Color Atlas, and special materials designed for the study, they cannot fail to strengthen the color thought and build a complete image of all color relations.

A. H. M.

CHESTNUT HILL, MASS., 1913.

*"A Color Notation." Munsell. Boston, 1907. Geo. H. Ellis Co.

†"Atlas of the Munsell Color System." Boston: Wadsworth, Howland Co., who also make the illustrative models, balls, spheres, cards, crayons, and water colors specially devised for this work.

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BALANCE AND UNBALANCE OF COLOR.

In a paint-shop the eye becomes so confused and wearied by a disordered variety of discordant colors that it gladly finds relief in a patch of quiet gray. Similar relief for the ear is wittily described by Dr. Holmes when "silence like a poultice comes to heal the blows of sound." As a timely escape from its opposite extreme, we welcome silence, but by no means would we wish it perpetual, for musical pleasure lies in a balance between no sound and too much sound. So the eye enjoys a balance between excess of color and its absence, and, when the mind is satisfied by the relations of light and color, we call the result beautiful.

Nature seems bent upon the preservation of this balance. She alternates sunshine and shadow, fiery sunset and gray day, yellow sand and purple-blue sea, teaching a great law,—that *only as small accents should strong colors be used to balance wide fields of grayer color.*

This seems simple enough as a broad statement, but grows complex as soon as we learn that a color is not the simple hue it appears to the eye, but *a variable union of three qualities which the thought must separate and judge.* Let us at once define these three qualities so clearly that they may never be confused, using a color sphere (Plate I).

THREE COLOR QUALITIES AND THEIR SCALES.

Color has three qualities: HUE, VALUE, and CHROMA (see page 9).

HUE is the name for a color, but not its value or chroma. The names and their order in a scale of hue are easily learned if one calls the thumb red, forefinger yellow, middle finger green, third finger blue, and little finger purple, between which come yellow-red (orange), green-yellow, blue-green, purple-blue, and red-purple.* These mark ten regular steps in a scale of hues spaced about the equator of a sphere. *H., Hue: horizontal color change.*

VALUE is the light of a color, but not its hue or chroma. With white at the top of a sphere and black at the bottom, the axis is imagined as a vertical scale of neutral grays from 0 (black) to 10 (white), with 5, or middle value, at the centre. Each hue on the equator is also graded by the same ten steps of value, often called tints and shades. *V., Value: vertical color change.*

CHROMA is the strength of a color, but not its hue or value. Gray added to red weakens its chroma, and the red on the equator of the sphere may be thus "grayed" in five equal steps to the neutral centre. Five stronger steps are outside the sphere, making a chroma scale from strongest red (10) to no red at the axis, with "*middle red*" at the surface. When middle gray is added to red, it does not change its hue (scarlet or crimson) nor change its value (lighter or darker): it only draws red in toward the neutral axis, which is loss of redness or chroma. As red escapes from gray, it grows to strongest chroma, loosely called pure, or intense. *C., Chroma: centrifugal color change.*

* See "Color Notation," Chapter III., The Hand as a Color Holder.

To omit one of these three qualities in describing a color is like stating the size of this room by two dimensions and ignoring the third, which leaves a vague and varying impression with each person. Thus viridian paint is called a "shade of green" (green hue and dark value), but that gives no hint of its chroma, which may be weak or strong, while the same word is used for a change of hue, as "this green shades on the blue." To avoid confusion, we must define viridian by stating where it stands in the scales of hue, value, and chroma, which are combined in the color sphere. *Until this is done, the color is not clearly before our thought, nor can we make it clear to others.**

A COLOR SPHERE UNITES HUE, VALUE, AND CHROMA.†

(See Plate I. and page 9.)

The *equator* of a sphere serves for a scale of hue, its *vertical axis* for a scale of value, and a *perpendicular to the axis* for a scale of chroma. The north pole is white, the south pole black. Middle gray is at the centre of the sphere, and middle colors at the same level on the surface. These middle colors are graded by regular steps of value to white and black on a large sphere for the teacher, and on a smaller model for children. Slowly revolved, these colors give a beautiful sequence that delights the eye, and, if rapidly spun, they all melt into neutral gray. This proves their perfect balance, for, were any hue too strong or too weak, it would destroy balance, making a colored gray. In handling this simple model, the child gains an unconscious grasp of color measure, and balance, *without the least allusion to color theory.*

* See Chapter I. and Appendix in "Color Notation" for "misleading color terms."

† See Chapter II. for the color sphere and tree.

NEIGHBORS AND OPPOSITES IN COLOR.

(See page 9.)

An amusing game will fix these relations in mind if the teacher furnishes conical finger-caps representing the five middle colors. These may be cut from sheets spread with water colors or special crayons.* The red cap is placed on the thumb (see page 5), yellow on forefinger, green on middle finger, blue on ring finger, and purple on the little finger.†

In grouping three hues, it is well to use neighbors for *likeness* and opposites for *contrast*, the former serving to soothe the eye and the latter to excite it. Thus yellow and purple are the neighbors of red (forefinger and little finger), while the spaces between them are its *close neighbors*, yellow-red (alias orange) and red-purple. Closing down or taking off the caps of two neighbors of red, there remain its two opposites, blue and green (the middle and ring fingers), between which lies its *exact opposite*, blue-green. This game may be played with each finger in turn until all the groups are memorized.

The contrasts, or opposites (called complements), are:—

RED and BLUE-GREEN

YELLOW and PURPLE-BLUE (ULTRAMARINE)

GREEN and RED-PURPLE

BLUE and YELLOW-RED (ORANGE)

PURPLE and GREEN-YELLOW

* The five middle colors are made both in crayons and water color.

† See Chapter III. of "Color Notation," and note that green is not the complement of red, as wrongly taught by Froebel balls and a three-color box.

THREE WAYS TO CORRECT UNBALANCE.

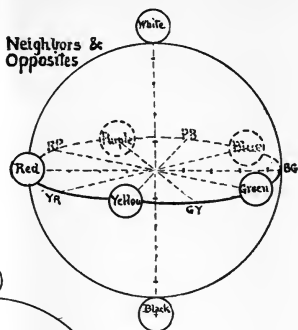
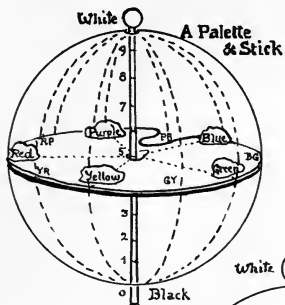
When first seen, the middle green, blue, and purple of the sphere are not unfamiliar, but middle red and middle yellow seem strange, because the extreme red and yellow, popularly taught, have much stronger chroma than their fellows. It is an educational blunder to ignore this fact, which the charts of the Atlas not only prove, but also help to correct by their written symbols. Colors of such unequal strength may be brought to a balance in three ways (see opposite page).

(a) The *stronger* of two colors may be grayed until both are of equal chroma. Thus middle red and middle blue-green are balanced, being of equal value, chroma, and mass.

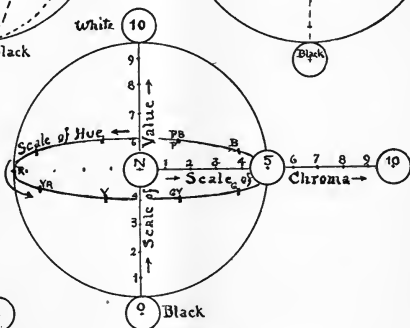
(b) A *lighter* color may balance a darker when equally removed from the neutral gray centre. Dark red and light blue-green of equal chroma will balance if equally above and below middle gray, and of equal mass.

(c) A *larger area* of one color may balance a smaller area of another if its chroma be weakened to the proportion indicated by the symbols printed on the charts, or the stronger color may retain its chroma, but be proportionally diminished in area. Thus a small area of the strongest yellow will balance a large area of weak purple-blue (ultramarine). This is a *balance of unequal strength and light by compensation of quantity*. Nature illustrates this by the spot of a brilliant sunflower against a background of gray-blue sky, or a purple aster against the large sunlit field of yellow-green, and countless examples appear in gems, insects, butterflies, and birds.*

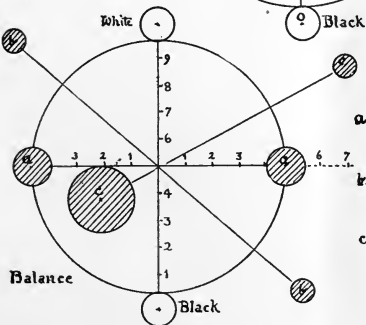
* See page 44 of "Color Notation" for balancing point of color.



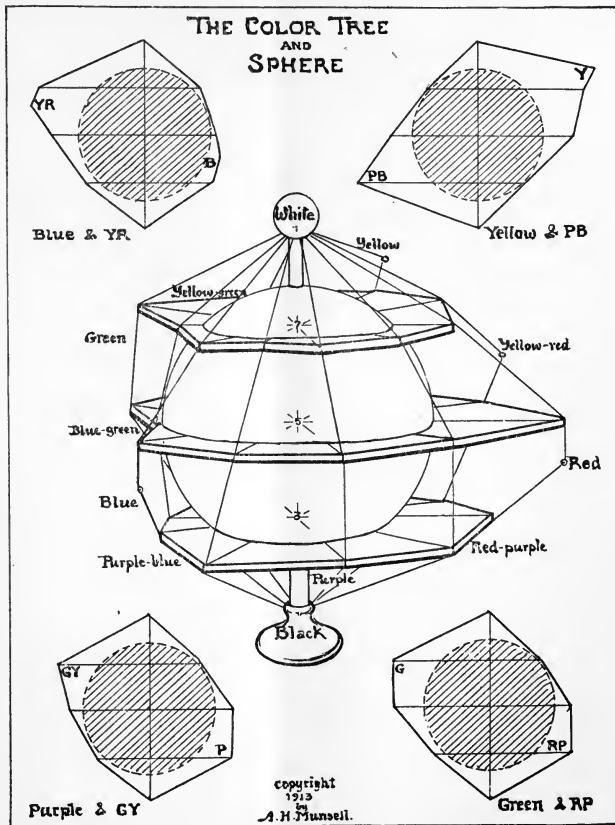
Three Color Scales
unite
in a Sphere



Balance



- a. By equality of chroma, value and mass:
- b. By equal departure from neutral gray:
- c. By compensation of mass to correct unequal value and chroma.



A COLOR TREE MEASURES ALL COLOR RELATIONS.

The color sphere can be no larger than its weakest blue-green paint, viridian, which is only half the strength of red vermilion, and the other colors will project beyond the surface in proportion to their chroma, as shown in the drawing opposite, with its four corner diagrams.

The irregular projections of this Color Tree describe the uneven light and strength of colors: thus yellow is near white, but as strong as the dark purple-blue, which is near black; while the red, which is strongest of all, has for its opposite the blue-green, which is weakest. Ten threads are drawn from black to white, each tracing a single hue in all its values, while each of the three horizontal slices contains the ten hues at a single level of value with all their chroma steps to gray of that level. These are worked out in solid oil paint in the charts of the Color Atlas, and indicate the proportions needed to make balance. A model of this Color Tree* is supplied to aid the imagination of those who find its irregular form difficult to realize.

Prismatic color differs greatly from pigments, both in its qualities of value and chroma, and its behavior when mixed. Its spectral hues *add* their light when mixed, as in the case of red and green, which unite to *form a yellow twice as luminous*; but a mixture of red and green paint makes a weak yellow-gray, as shown by a line joining them on the charts of the Atlas. An explanation of this will be found on page 51 of "Color Notation."

*See Appendix to Chapter II. of "Color Notation," and note that lithographic inks used in Plate I. reverse the chroma of blue and green.

QUESTIONS AND THOUGHTS FOR THE TEACHER.*

Why is the training of the color sense left so much to guesswork and accident?

"I don't know much about color, but I know what I like," is often heard, and many who, without chart or compass, brave the sea of color daily, refuse to recognize the cause of their blunders, although willing to acknowledge ignorance in other lines. Haphazardly they pick up loose notions, which fail when put to a test.

Music is definitely taught, but color remains vague. Color guesses are loose and fluctuating: they should be corrected by measured scales, so as to free the mind from false tradition and lead to straight color thinking. To see and feel color is not enough, for an idiot may see it, but does not think about it, and, in order that the thought may lay hold on color, we must have a definite method. To illustrate this, take a painter's palette and mahl-stick (see page 9). From a host of paints let us choose a few, and place them around the palette's rim. Some are dark, like blue, and others, like yellow, very light, but, mixing some of each, we may make a middle gray. Placing this gray at the middle of the stick, we may lighten it to white at the top and darken it to black below: then, supposing a sphere to enclose both stick and palette, the colors on the latter's rim may be graded upward to white and down to black. This is the germ of the color sphere and its measured scales.

* Those who would rather practise than reason about color may pass at once to the model lessons (page 16), although a method of thought here suggested might save them from "immodestly smearing from muddled palettes, amazing pigments mismated" (Kipling).

How does this system differ from others?

It starts in the middle of color, not at the extremes. These middle colors are named, imitated, and memorized, then sought in one's surroundings, and thus form a threshold from which the thought may range by uniform scales to white and to black,—to strongest chroma and to neutral gray. Measure and balance are thus learned without any attempt to explain theory, and lead to skill and good taste in the use of color. This puts science under the art of design instead of whim, accident, and the vagaries of personal assertion; while the Sphere, Atlas, and Tree build a stable image of all color relations, essential in every line of work,—artistic, scientific, or industrial.

Why begin with such quiet colors, if the child craves the strongest obtainable?

A child craves many things beyond his control, and they are wisely withheld until he is trained to their proper use. Long training and experiment teach the colorist how to use even the strongest colors so as to preserve a pleasing balance, but the novice cannot fail to blunder and misuse them. We have grown up in a bad tradition that the strongest red, yellow, and blue paints are "primary," which teaches a false idea of balance,* ignores the fundamental action of the eye, and refutes the wisdom shown in every other form of sense training, where, to introduce the study of music, motion, or speech, extreme stimuli are never used. Instead of extremes we seek moderate and tempered relations, convinced that they are the basis of beauty.

This is true in both fine and decorative uses of color, and may be proved easily in any museum of art. Take in one hand the un-

* See Appendix to Chapter III. of "Color Notation."

balanced maxima and in the other the balanced middle colors of the sphere, and it becomes evident that the latter, with their neighbors, recur constantly in the most beautiful examples, while the maxima are absent or only admitted as small accents.

Gaudy colors are avoided by persons of good taste. They "clash, howl, and swear," and belong to the circus rather than the home; and, since first impressions are lasting, children should not be exposed to such crude and unbalanced effects, which must delay, if they do not destroy, the feeling and love for beautiful color.*

The lessons which follow have been tested in the school-room, and are economic of time. They train the appreciation of color by simple, progressive steps that may be accurately described, intelligently taken, and clearly criticised by both pupil and teacher. They discard the hazy statements which have proved so misleading in the past and whose further retention in the teaching of color can be due only to mental inertia or ignorance.

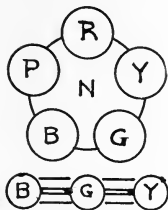
* See Plates II. and III. of "Color Notation."

A COLOR SYSTEM AND COURSE OF STUDY

BASED ON THE COLOR SOLID AND ITS CHARTS,
ADAPTED TO NINE YEARS OF SCHOOL LIFE.

Grade.	Subject.	Colors Studied.	Illustration.	Applica- tion.	Materials.
1.	HUES of color.	Red. Yellow. Green. Blue. Purple. R. Y. G. B. P.	Sought in Nature and Art.	Borders and Rosettes.	Colored crayons and papers.
2.	HUES of color.	Yellow-red. Green-yellow. Blue-green. Purple-blue. Red-purple. YR. GY. BG. PB. RP.	Sought in Nature and Art.	Borders and Rosettes.	Colored crayons and papers.
3.	VALUES of color.	Light, middle, and dark " " " " " " " " "	Sought in Nature and Art.	Design.	Color sphere.
4.	VALUES of color.	5 values of YR. " " " GY. " " " BG. " " " PB. " " " RP. } 2, 2, 5, 3, 1.	Sought in Nature and Art.	Design.	Charts.
5.	CHROMAS of color.	3 chromas of R ² . " " " Y ² . " " " G ² . " " " B ² . " " " P ² .	Sought in Nature and Art.	Design.	Charts.
6.	CHROMAS of color.	3 chromas of YR ² . " " " GY ² . " " " BG ² . " " " PB ² . " " " RP ² . " " " R ² and R ³ . " " " Y ² " Y ³ . " " " G ² " G ³ . " " " B ² " B ³ . " " " P ² " P ³ . } " " " " " " }	Sought in Nature and Art.	Design.	Color Tree.
7.	TO OBSERVE IMITATE & WRITE	color by HUE, VALUE, and CHROMA	"	"	Paints.
8.	QUANTITY of color. Pairs of equal area and unequal area Balanced by HUE, VALUE, and CHROMA.		"	"	Paints.
9.	QUANTITY of color. Triads of equal area and unequal area Balanced by HUE, VALUE, and CHROMA.		"	"	Paints.

PLAN FOR FIRST YEAR.



Three short lessons of fifteen to twenty minutes per week.

Materials: five crayons and light gray paper.

To learn the five principal hues: to name them promptly, match them with cards and crayons, and place them in right order.

Make the child familiar with MIDDLE HUES, and *contrast middle red*, yellow, green, blue, and purple with the *strongest red*, yellow, and blue. Keep these balanced colors in sight, as cards, crayons, balls, and common objects, and spin the sphere to show their balance.

Place a circle of middle red at the top of a card to be taken home, asking each child to collect similar reds to be fastened on the card. Compare the samples collected, and ask, "Do they match?" First note the *like* colors, then the *unlike* ones, asking, "What difference is there? Is one lighter than another? is one darker? Is one stronger or weaker than another?" (Terms "value" and "chroma" may wait until later.) Which is most like the red circle among all the samples, such as a rubber ball, piece of coral, autumn leaf, piece of cloth or paper, or stone or glass?

Then find middle red on the sphere, imitate it with the red crayon, and use it in a simple border or pattern until it is easily remembered and correctly named.

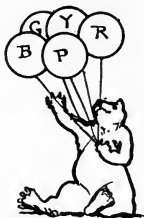
Treat *middle yellow, green, blue, and purple* in the same way, and, when the five cards are filled with samples, place them in a circle to learn the *order of hues*. Show this order on the sphere, and devise games with the fingers, crayons, cards, etc., to fix this order in memory (see page 7).

On a new card place the five middle hues in a circle, and, filling one with the red crayon, ask, "Which color comes next?" and so on until each child has made the set. Spin the sphere until the middle hues all melt in a MIDDLE GRAY, and imitate this with the gray crayon.

Give children a hectographed outline of man with five toy balloons (one may substitute a bear or other animal in place of the man), and let them fill the balloons with four of the five colors, asking, Which has been left out and why?

Give a rule for design. Use a hue and its two neighbors for *likeness* (or its two opposites for contrast). Do not use all five together.

The six cards made this year can be tied in order into a small book of HUES of COLOR, with simple design on cover.*



* See Plate II., page 62, "Color Notation."

A LESSON ABOUT RED.

Place the color sphere before the class, with cards, crayons, and balls ready for comparison, and give the child a red crayon with light gray paper, after he learns the name. This first lesson should resemble a game, and last not over fifteen minutes.



Spin the sphere until it becomes neutral gray, and then slow it down until the colors flash (seeming to float over the surface and be brilliant). This will fix the attention and excite questions.

Ask, "What do you see? Colors? What colors?" Red is generally noticed first, so hold up a large red card (middle red), and ask, "What else has this color?" Apple, tulip, head of match, coral, rubber band, lips, and cheek.

Say, "This is *red*," "*middle red*," and match it with card, ball, and crayon. Hide something of this color, and suggest a hunt for it. When found, hold them up together, and call them *red*. Tell a story that brings in a red soldier, doll, or sealing wax, and ask child for other reds, which are not "*middle*."

SECOND LESSON ON RED.

Give hectographed outline of simple figure, such as bear, sunbonnet baby, or rose, to be filled with the red crayon or partly uncovered, as the child prefers. Place these in a row, and call them the *red family*.



Show white and black on the sphere, and say, "This red is in the middle between them." Then show reds that are lighter or darker, merely to emphasize *middle red*.

Devise a game with the red ball, and then show it against the other balls and the sphere to *contrast red with the other hues*.

Give child a card with a circle of red at the top, to be taken home, and have other red samples added, as near middle red as may be found. (With succeeding cards for the other colors this will make a book of MIDDLE HUES during the year.)

Likeness is first sought. "Can we find another like this? Is it just the same? What difference is there? Bring all that look like this."

Name is then learned, using stories and games to fix it.

Color is imitated with crayon after finding it on sphere and among a collection of the cards and balls, which may be strung together as a necklace or bracelet.

(Teacher should fill this outline as best fits the class).

REVIEW LESSON ON FIVE MIDDLE COLORS.



Each child spreads out his five cards.

Sphere is spun to show balance in gray.

Ask what objects have been found like the middle red, and how they differ.

Same for yellow: butterfly, window-shade, horse-blanket, marble, autumn leaf.

Same for green: grass, paroquet, jade.

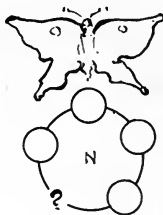
Same for blue: sky, forget-me-not, turquoise.

Same for purple: aster, lilac, grapes, amethyst.

Teacher holds out a box with color balls and cards. First row: each comes and takes a red ball away.

Second row: does the same with yellow, and so on until each child has a color ball. Then by calling for groups of three *neighbors* in color, with each of the five in turn, the class may exchange places. *Opposite* colors may then be grouped in the same way. This is to illustrate the suggestion on page 7, where the teacher puts a colored cap on each finger, and shows which are neighboring hues, because they resemble one another, and which are opposite, because they contrast each other. The term "complement" need not be used, nor any long words, such as "analogous," "dominant," or "related."

Devise a game of tag or of merry-go-round to group the five colors in order, and then disarrange them, so that the children shall rearrange them in order. Give hectographed outline of five candles or soap bubbles, or a simple sketch for the child to fill in, as he prefers, using *four* of the colors, and then ask why the fifth is left out, and compare results to see what is liked best and what is least used.



Ask what color has the largest field in the sketch, and if the child would have preferred another hue instead, so as to prepare for the mixtures of color next to be studied. Some may have overrun the lines or purposely mingled two crayons in filling the shapes. Ask what this has done to the hue, and suggest that the two names can be joined, as yellow-red, green-blue, etc.

Design simple border, using only three crayons,—a hue and its *neighbors* or a hue and its *opposites*,—and apply this to cover of the first year's book containing the collection each child has made for the FIVE MIDDLE HUES.

PLAN FOR SECOND YEAR.



Four lessons of fifteen to twenty minutes per week.

Materials: crayons and light gray paper.

To learn the circuit of ten HUES and memorize groups of NEIGHBORS and OPPOSITES.

Review work of first grade. Place three circles at top of a card; use red crayon to fill the first, yellow crayon to fill the last, and in the middle circle make alternate strokes of red and yellow as close together as possible, to give a yellow-red hue at a short distance. Call YELLOW-RED a "between," or intermediate, hue, and write it by its initials YR.

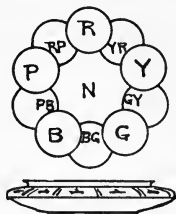
Let the child take this card home, and hunt for like color in cloth, paper, wood, buttons, yarns, and magazine covers, then compare the collections, and ask, "Which matches best this hue?"

Then ask: "What difference is seen? Is one more red or more yellow than another? Is it lighter or darker, weaker or stronger?" This prepares for a later study of value and chroma. But only the hue is emphasized.

Make a border or pattern at bottom of the card, using red and yellow touches, and ask, "What hue appears when they are mixed?" Correct misnomers (orange or geranium), and say, "This is yellow-red, YR."

Treat green-yellow, blue-green, purple-blue, and red-purple in this way, until the child has five cards holding his collection of hues, with simple patterns made of NEIGHBORS.

Place the five cards in a circle to show the *order of ten hues*, then repeat the balloon man, or bear, or candles, but give the five "between hues" instead of the principal hues. The teacher may easily make five conical caps for the fingers from semicircles of one inch radius, coloring them with the five intermediates, and placing them in the hollows between the fingers, while the five of the previous year are set on the finger tips. Learn to repeat them in order, beginning with any hue, and to write them by their initials.



On a new card draw a large circle divided in ten steps, and make the "between" circles smaller or behind the principal hues.* Devise a game to fix in memory the "OPPOSITES," or pairs of complements (not using the long word), and say they *contrast* each other, while *close neighbors are very like* each other.

Use opposites in borders or rosettes on bowls, towels, and cardboard box. Review NEIGHBORS and OPPOSITES.

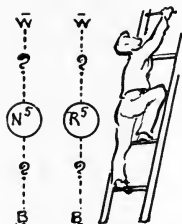
* See Plate II., page 62, "Color Notation."

PLAN FOR THIRD YEAR.

Black and gray crayon in addition to those already used, on gray paper.

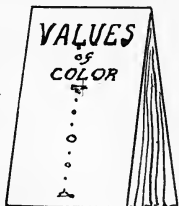
To learn VALUES of color and gray, commonly called "tints and shades," of which the middle value (5) is already familiar.

Review work of second grade, using the book the child has made and a circle of ten hues. Hang up a large neutral scale, and ask which of the steps is used in the circle of middle hues.



Place MIDDLE GRAY in the centre of a card, writing white at the top and black at the bottom, and suggest that from black to middle gray and from middle gray to white are long steps. Would it not be easier to take two moderate steps instead of the long one? Help the child to find a gray half-way between black and middle gray and another above half-way to white. Ask if the steps all look equal. Which of them should be changed? These values may be made with the gray and black crayon on loose paper, and pasted on the card, after choosing the best light gray and dark gray to make an even scale. Say it is like the cellar steps or a man climbing a ladder.

Take card home and hunt for grays to match the VALUE SCALE. Ask if they are exactly the same. Which are lighter? Which are darker? Say we cannot make a full black or a full white that will stand, so that practical black is 1 and practical white 9, the steps between falling at 3, 5, and 7. Should any samples fall half-way between these values, call them 2, 4, 6, or 8. (Ideal white, 10, and ideal black, 0, are only found in a photometer. See page 40 of "Color Notation.")

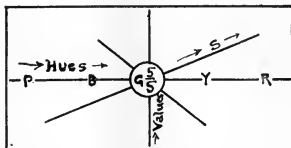


Design a ribbon in three values,—first with strong contrast (1, 5, 9), then with small steps (4, 5, 6), then a light series (7, 8, 9) and a dark series (1, 2, 3); finally, two light values with a dark (3, 6–8), using twice as much of the dark to balance the light values. Illustrate BALANCE by a pair of scales, and CONTRAST by day and night.

Place MIDDLE RED in centre of card, writing white above and black below, and ask the child for new steps of red half-way to white and half-way to black, calling them *light red* and *dark red*. Make trial mixtures of the red crayon with black and on white paper, from which the best are chosen for the card.

Treat this red card and its fellows, yellow, green, blue, and purple, as was done with the gray card. Bind these in a book of COLOR VALUES.

FOURTH YEAR.



This grade often "marks time," and so it offers leisure to review what has been learned of HUES and VALUES, with a side glance at chroma when it is noticed in the child's work, but leaving its study to the sixth year.

With some children it may be well to use water colors * in reviewing hue and value, and in that case the accidents of drying will force attention on the stronger and weaker chromas.

The crayons may be used in copying a design on some fabric, when the wax can be fixed by pressure with a hot iron. Estimates of color gained from the *fixed hues and values* of the crayons may be widened by the *flexible mixtures* of water color and design fitted to useful objects, such as bags, book covers, blotters, etc.

* Crayons or water color, as teacher thinks best.

FIFTH YEAR.

Materials: water colors of the five middle hues, with gray and black, and the maxima of red, yellow, and blue for contrast.*

Each of the ten hues should be given a scale of value from black (1) to white (10), using loose paper and selecting the smoothest steps for pasting on cards. The ten cards are then laid in order, forming a COLOR FIELD (see Chapter VI. of the "Notation"), and the idea of *written color suggested*.

Green should first be given the centre of the field, but an amusing game may be made by taking each hue in turn as a centre. Through the green centre ($G\frac{5}{5}$) there are three paths: *the hue path* (horizontal) to red on one side and purple on the other is already familiar, also the *value path* (vertical); and next comes *the slant path* (oblique) from dark red to light purple, or from dark purple to light red. Each hue becomes the centre in turn.

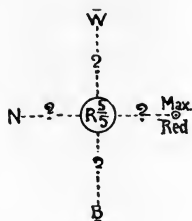
Three steps in one of these paths may be taken by the child to fill a design,—first with *wide contrasts* and then with *small contrasts*, and find what each is best fitted for (latter for interior decoration and former for advertisement).

Make book of color field and a design for the year's work.
A few good Japanese prints will prove very helpful.

*Crayons or water color, as teacher thinks best.

SIXTH YEAR.

Materials: water colors and light gray paper.



CHROMA, already noticed in the varying strength of color washes, is now to be studied by a definite scale and related to hue and value.

Place a spot of middle red in centre of the paper, writing *white* at top and *black* at bottom, with *middle gray* on a level with the red at the left edge and strong red opposite at right-hand edge.

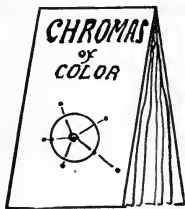
Ask class to collect all the reds they can find, and, choosing those nearest middle value, arrange them from weakest near gray to the strongest at the right. Say, "This is CHROMA,—strength of color,"—and distinguish it from hue or value. Ask if the chroma steps are equal. Why not? Which is too great? which too small? Which is half-way from gray to middle red? and which half-way to strongest red?

Then, taking the strong red paint, weaken it by additions of middle red on a loose sheet until the proper chroma is found and placed in the scale. Then mix gray with middle red to continue the scale, and, having selected the best steps of chroma, paste them on the sheet. Make a chroma sheet for each of the principal hues, and select three chromas for a design.

SEVENTH YEAR.

CHROMA continued, with the same materials and the use of the COLOR ATLAS in designing balanced masses of color. Compose a book from the chromas of the previous year.

On the paper place a circle with five equidistant radii (copied from the Atlas), and place the middle colors on the circle, adding stronger chromas on the radii prolonged outside as far as the pigment allows.



Add gray to the middle colors for the weaker chromas inside the circle, and insist that all these scales of chroma must be of middle value, neither lighter nor darker.

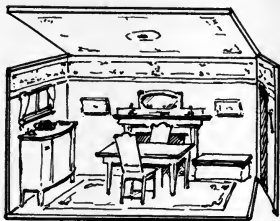
Select three colors,—a middle hue with a stronger neighbor to one side and a weaker to the other, so as to *balance on the middle hue*.

Select a strong color and its weaker opposite, making the area of the strong accent small and that of the weak opposite large,* and with these selections decorate some object, such as a book-holder (for boys using wood), or a work-bag for the girls, using cloth.

Illustrate BALANCE by pendulum, scales, tight-rope dancer, etc.

* See Plate III., "Color Notation."

EIGHTH YEAR.



CHROMA continued, with the study of CLOSE NEIGHBORS and EXACT OPPOSITES; also *accent* and *balance*.

Chroma scales for the five intermediate hues are to be made and united in a circle, as for the principal hues in the preceding grade. This brings out unusual color steps, whose rarity is of interest.

THE COLOR TREE is used to study unbalanced relations, which are then corrected, as told on page 8. BALANCE may be made on middle gray, as in the case of yellow (zinc yellow) with purple-blue (ultramarine), or lighter and darker balances on neutral gray (7) and neutral gray (3). This may also be done with other pairs, as dark green with light purple-red or dark red with light blue-green, and the reverse.

ACCENT is taught with small spots of strong chroma to balance large fields of weak chroma, taking the proportions from the charts of the ATLAS, using the *Middle Chart* (5) with *Light and Dark Charts* (7 and 3). Examples sought in Art and Nature.

Two designs to illustrate accent and balance.

NINTH YEAR.

This grade becomes the first year of high school in many courses, and should have a direct bearing on the cultivation of taste in dress and interior decoration.

A pasteboard box, whose least dimension is ten inches, may be arranged as a model room (the ceiling and one wall hinged to open), the pupils uniting to design all the forms and colors, including furniture, hangings, floor and wall covers, as a practical study of unity of effect with balance of color. (See page opposite.)

The color scheme is then recorded by the notation, and a similar plan used in designing a costume with the domination of one hue, balanced by small contrasting accents.

The steps of color training and memorization by definite scales which have been outlined in these lessons can be clearly taught. The average child carries them out with intelligent pleasure instead of blind fumbles with unknown degrees of color. Even the rare child who shows pictorial skill gains a sure foundation on which to build the subtleties of aërial color, while a clever teacher weds these exact scales to Nature Study and other parts of the curriculum.

AFTERWORD.

Subtle color and fine music appeal to feeling rather than analysis. An unconscious habit of discrimination swifter than any thought that can find expression in words, will develop in those who surround themselves by refined harmonies. Thus the decoration of the school-room and the colors worn by the teacher exert a more powerful influence than any formal instruction. "Example is stronger than precept."

Neglect to employ this silent but continuous pressure toward the wise use of color in every-day life will go far to thwart the aim of the study. Practical applications of color to design should take precedence, for they are valuable both in the home and in commercial or industrial work. Picture-making is not encouraged in these lessons, since its intricacies of color envelope and perspective require special aptitude and a long training quite beyond the scope of common education. It does not fall to the lot of one child in a thousand to attempt the artist's career, yet to this rare nature the measured proportions and exact exercises are as necessary as musical scales to a future composer. Finally, remember that both pupil and teacher are happier in *doing a little very well* rather than failing in too ambitious an effort.*

* See Appendix to Chapter IV. of "Color Notation."

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