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INTER-SOCIETY COLOR COUNCIL

NEWS LETTER No. 80

JANUARY 1949

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ANNUAL MEETING

March 9

The 18th annual meeting of the Inter-Society Color Council will be held on Wednesday, March 9, 1949, in the New York Statler Hotel (formerly Hotel Pennsylvania). The meeting will consist of a Discussion Session in charge of the Problems Committee, Professor M. J. Zigler, Chairman. Sub-committees will report on the following problems:

- 2 - Color Names (Revision of), Deane B. Judd, Ch.
- 6 - Color Terms, Sidney M. Newhall, Ch.
- 7 - Color Specifications, Walter C. Granville, Ch.
- 12 - Studies of Illuminating and Viewing Conditions in the Colorimetry of Reflecting Materials, D. B. Judd, Ch.
- 14 - A Study of Transparent Standards Using Single-Number Specifications, Robert H. Osborn, Ch.

A business session will conclude the afternoon meeting. Anyone interested is invited to attend. Hotel reservations should be made directly to the hotel at least ten days prior to the meeting, indicating that you are attending the ISCC meeting.

Meetings of the Optical Society of America are scheduled for the same hotel, March 10 - 12. It is usual for one or more O.S.A. sessions to be devoted to color (the Editor knowing of at least two submitted color papers), and it is therefore suggested that all ISCC members who are interested plan to remain for the O.S.A. meetings. Programs for the O. S. A. meeting may be obtained on request to the O. S. A. secretary, Professor A. C. Hardy, Massachusetts Institute of Technology, Cambridge 39, Mass.

COMING MEETINGS

The American Institute of Architects, meeting in Houston, Texas, the week of March 14, plans to hold seminar sessions on color. A number of Council delegates and members will be on this program; they include I. A. Balinkin, Ralph Evans, Carl Foss, Faber Birren and Julian Garnsey. Plans for the meeting are in the hands of Walter A. Taylor of A. I. A. headquarters. Waldron Faulkner, Washington architect and long a member of the Washington-Baltimore color group, will be chairman of the color sessions. (Incidentally, the application of the A. I. A. for membership in the ISCC is expected to come before the annual meeting in March.

On invitation of the Illuminating Engineering Society, the ISCC will arrange a session on color for the 1949 Annual I. E. S. Technical Conference to be held in September at French Lick, Indiana. Norman Macbeth, chairman of I. E. S. delegates to the Council, has been appointed chairman of a committee to arrange this program.

WASHINGTON-BALTIMORE COLORISTS

On December 13 about sixty persons attended a meeting of this color group. After gathering for dinner at the Hot Shoppe in Bethesda, Md., they adjourned to the Gardner Laboratory at 4723 Elm Street, Bethesda (a Washington suburb) where Richard Hunter of the Gardner Laboratory and chairman of the American Ceramic Society delegation, described the photoelectric instruments he has designed to measure different factors of appearance.

These are the new direct-reading color and color-difference meter, the multipurpose reflectometer, a number of different glossmeters, and the recently developed continuously recording instruments for photoelectric measurements. Samples of paints, papers and textile materials submitted by customers were used to demonstrate the different measurement problems to which the instruments are applicable. Mr. Hunter talked briefly on the designs of these instruments and techniques for using them successfully. Opportunity was given to experiment with the different instruments.

The January meeting is scheduled as a joint one with the local Illuminating Engineering Society group on January 31. W. H. Kahler of Westinghouse and J. A. Meacham of Sherwin-Williams of Cleveland will present the discussion they gave in New Orleans a year ago on the relation of brightness ratios and decoration.

PHILADELPHIA-WILMINGTON COLOR GROUP

The latest meeting which we were able to report in our November issue for this most recent addition to the local affiliates of the Council was one which took place early in October. On December 14 they had the pleasure of hearing Dr. Norman F. Barnes of General Electric Company, who spoke on the subject "Color Facts and Fantasies" at the Philadelphia Textile Institute. Dr. Barnes gave a very clear and entertaining description of the basic facts of color and color measurement. His program was thoroughly illustrated by demonstrations so numerous and well chosen that both "Fact and Fantasy" were easily comprehensible to all present. Dr. Barnes approached color from the physical viewpoint reviewing additive and subtractive color development, the Maxwell disk system and the Munsell color solid.

The fundamentals of spectrophotometry were then discussed through the construction principles of the instrument and its use for identification of colorants, color matching, and standardization of such varied products as the American Flag; human blood, white pigments and pale ale. Of particular interest to several practicing color matchers present was the application of spectrophotometry to the choice of the minimum number of colorants thereby avoiding the unnecessarily intricate compounding of toner upon toner which so often occurs in visual work. Dr. Barnes' demonstrations of fluorescent and phosphorescent colors, interference colors from soap bubbles, apparent hue versus illumination, and of miscellaneous color psychology facts were excellent. The group has members representing a very wide range of color problems; it is a tribute to Dr. Barnes that he was able to touch on many of them so well.

The next meeting of the Group was scheduled to be held on February 2, 1949 at the Woodmere Art Gallery, 9201 Germantown Ave., Chestnut Hill, Pa. A well known authority, Mr. Walter Granville of the Container Corporation of America and unusually successful chairman of the ISCC Membership Committee, was to speak on "Trends in Color Organization." The group was to meet for dinner and have an opportunity to visit the Gallery. All persons interested in color problems were invited to attend.

CALIFORNIA COLOR SOCIETY We are informed that a meeting of the California Color Society was held on Tuesday evening, December 1, 1948, at the Art Center School, Los Angeles, at 5353 West 3rd Street. As we go to press we have received no details, except note that Mr. Roswell Blackinton, well known paint chemist of the Western States Lacquer Company, spoke on the subject "Optical Aspects of Color."

PHYSICAL SOCIETY COLOR GROUP This active group met for its forty-second science meeting on 10 November, 1948, at the Lighting Service Bureau, 2 Savoy Hill, London W.C.2. The program included an informal report on the meeting of the Commission Internationale de l'Eclairage (I.C.I.) in Paris, July 1948, and the following two papers: Measurement, Representation and Specification of Colour and Colour-rendering Properties of Light Sources, by G. T. Winch and H. R. Ruff; and Fluorescent Lamp Artificial Daylight Units for Colour Matching, by G. T. Winch, W. Harrison and H. R. Ruff.

The forty-third science meeting was held on 8th December in the Large Physics Lecture Theatre of Imperial College, Imperial Institute Road, London S.W.7. The papers were: The Scotopic Visibility Function, by B. H. Crawford; and Visual Purple and the Photopic Luminosity Curve, by H. J. A. Dartnall.

A notice indicates that for the Physical Society Exhibition in April the Colour Group Committee proposes to collect together a number of demonstrations of experiments in colour vision such as Benham's top, Bidwell's ghost and Bidwell's rotating disk. The Committee will be grateful for such suggestions of experiments or for the loan of apparatus for demonstrations. Correspondence should be directed to the Honorable Secretary of the Colour Group, The Physical Society, 1 Lowther Gardens, Prince Consort Road, London S.W.7.

PROMOTION OF DR. KREIDL It is with great pleasure that we are able to report the promotion of Dr. Norbert J. Kreidl, a frequent contributor to these pages, to be Director of Chemical Research of Bausch and Lomb Optical Company, Rochester, N.Y. He succeeds Dr. Frank L. Jones, who joined the Research Division of Koppers Co. in Pittsburgh. Dr. Kreidl is well known to many members of the ISCC and of the Optical Society of America, and we have had several occasions to thank him for the fine reports he has sent us of color developments in the glass and ceramic fields and of meetings in these fields. The Bausch and Lomb Optical Company is a fine concern, for many years a Corporation member of the Optical Society of America participating in the latter's preeminent position in the color-science field, that society being one of the ISCC's original member-bodies. Bausch and Lomb and Dr. Kreidl are both to be congratulated.

FULL LECTURE PROGRAM FOR DR. BALINKIN Several of our members lecture often on the subject of color, but we believe that our vice-chairman, Dr. I. A. Balinkin, holds the record for the winter season, if not for many seasons. His lecture-demonstrations on "Color Phenomena" are in constant demand. In January he was to give them before the Cranbrook

Institute of Science in Bloomfield Hills, Michigan, in February before the Royal Canadian Institute at the University of Toronto, and in March before the American Institute of Architects. In addition, an invitation lecture on January 28 on "Techniques for Demonstrating Color Phonomena" is scheduled for the New York meeting of the American Association of Physics Teachers.

For those of you who see the Architectural Forum, we refer you to the November issue, which discusses "Measure." Heat, atmosphere, light, sound, enclosure, esthetics, houses, space -- all these were discussed under the title Measure. In the list of specialists consulted, we find the names of Balinkin, Harmon and McCandless.

COLORFUL CHRISTMAS PRESENTATION The verses below, written by Dr. K. S. Gibson of the National Bureau of Standards, international authority on spectrophotometry and former president of the Optical Society of America, to accompany a Christmas gift presented to Dr. Judd by the girls of his section, need a word of explanation. It seems that Dr. Judd often gets cold, not an unusual experience for a former athlete forced to spend long hours at a desk. To help keep warm he has at hand an old sweater, used for its customary purpose until the elbows wore out, but more recently as a lap robe -- to throw over his knees when cold. Through the years pieces were torn out, more and more as the years went by, torn at times, so he says, when he was tempted to tear his hair. (The Editor, who wears his hair departed in the middle, will have to buy a sweater.) At any rate, the girls in the section could stand it (the sweater) no longer. So among them they made an afghan for him. Dr. Judd says that the colors provide a random sampling of the exterior of the color solid, and Dr. Gibson says that after one goes by Judd's office one sees after-images all the way down the hall! And one may read below what else he says. (Ed. Note: This is not the first time these pages have been graced by Dr. Gibson's verse, a reflection of the humorous twinkle one nearly always sees in his eyes. Many will remember his "Diffuse Reflections," written on a train trip and reproduced in ISCC News Letter No. 55; September 1944.)

THE OLD DINGY SWEATER (To the Tune of "The Old Oaken Bucket")
(Drip, drip, drip)

How dear to my heart are the girls of my section,
Their bright shining faces so cheerfully gleam;
They sing while they work and they prattle so blithely,
That nothing could bother them here it would seem.
But how it dismays them, distresses and slays them
To see Doctor Judd on a cold winter's day
Reach out for that sweater, that dingy old sweater
To wrap up his legs in that cold-blooded way.
That mangy old sweater, that moth-eaten sweater,
That dad-ratted sweater that lies in the tray.

So each day at lunch as they ate and they gossiped
They wondered just what in the world they could do
To get that old sweater (that ancient old relic)
Forever and ever away from their view;
And while they were sitting, and talking and knitting,
A wonderful thought rang their domes like a bell;
With true Christmas spirit they'd make him a something
And drown the old sweater way down in some well.
That rusty old sweater, that moss-covered sweater,
That ding-blasted sweater, - Oh, that would be swell!

So all of the girls started flashing their needles
  With yarn of bright colors and chromas galore,
And some knitted lengthwise and some knitted crosswise
  And some dropped their stitches all over the floor.
They ribbed and they purl-ed, they twisted and twirl-ed
  Until they had finished this thing they now hold;
They made a new Afghan, a nice pretty Afghan
  To keep him all cozy whenever he's cold;
An exquisite Afghan, a soft fuzzy Afghan,
  A ding-dongy Afghan, with colors so bold.

Just look at the hues that impinge on your vision
  With chromas so strong they can stand all alone.
The girls really feel that perhaps they've created
  The only existing chromatic cyclone.
Throw out the old sweater; here's something far better
  Presented with love by the girls of 1.5;
Whene'er he gets chilled and his knees they start shaking
  This soft clinging Afghan will help him survive;
This glorious Afghan, this loud noisy Afghan,
  This hot-doggy Afghan, will keep him alive.

TCCA ACTIVITIES We have at hand six pages of single-spaced text concerning the manifold activities of The Textile Color Card Association of the U. S., Inc. While this volume makes abstracting and condensation a difficult task, it nevertheless indicates clearly some indication of the continuing activity of the TCCA, by no means notable merely for magnitude. We cannot hope to reproduce and pass on to you any inkling of the spirited style in which the Association's dynamic Managing Director, Margaret Hayden Rorke, describes its work. The best we can do is to repeat in dry-as-dust form the advance, confidential list of colors for future seasons and various purposes sent out to the members of the TCCA.

The notes at hand deal with 1949 new colors, including Spring Hosiery colors and Fall Woolen, Rayon and Men's Felt-Hat Body Colors. The 1949 Spring Hosiery Colors are nine in number. Among these, Blueglo is described as a shadowy and illusive "mist tone," blending subtly with costumes in navy and "cool metallic blues" as well as Admiral Blue shoes. Bronzique goes well with rich bronzy or golden brown costumes and bronze shoes. A dark color, Café Brown, a "subtle dusky brown," contributes a note of elegance to costumes in coffee, tobacco and other deep browns, as well as dusty bluish or grayish greens, grayed purples and black, and of course with Café Brown shoes as well as Continental Green and black ones. Sunsparkle is a "suntinted flesh tone," affords an attractive accent to the 19th Century Pastels formerly featured by the TCCA; it can be used with sports and play attire as well as with glamorous evening gowns. Summer Taupe is a suave and discreet "neutral" which as such can be used with a wide range of colors. Apéritif is a spirited light brown according well with ginger, cinnamon, copper kettle, acajou and other rosy or reddish browns and rusts; emerald, bronzy or mossy greens, amber, burnt apricot, peacock, duck and greenish sea blues. Cloudy gray is a medium gray for wear with slate and smoke shades, metallic grays in the silver and steel range, mauve, lilac, blueberry, eggplant and other purplish colors, navy grayed blues, dusty rose, cardinal, garnet reds and black. Ambergleam adds a sparkling accent to spring costumes in metal tans, warm light browns of the toast or cocoa variety, tawny beiges, tarnished gold and topaz tan. It goes well with lime, mint, emerald and other greens; the shrimp, flamingo and coral range, aqua, turquoise and the sprightly Cruiseway Colors. Naive Beige is a "muted" beige of great adaptability for wear with spring costume colors. It goes well with the newest blues, including the smart flame type and the violet-tinged periwinkle and cornflower scale as well as the metallic blues and navy; also with the rose to red range, as the bright "live-coal" type, geranium and ruby, and a restrained accent to magenta, cyclamen, orchid, helio and other violine colors suggesting the Mauve Decade. Bulletins issued by the TCCA show what shoe colors harmonize with these spring nylon colors.

The 1949 Fall Colors for Men's Felt Hat Bodies include Woodbrown, a "neutral" brown, Heathblu, a hazy grayish blue, and Ashengreen, a "muted smoky" green. These are closely coordinated with advance color trends in men's suitings and overcoatings. The Confidential Advance Woolen Collection for Fall 1949, just issued by the Association to its members, features the "After-Five" Tone-on-Tones, "muted misty" colors useful as duotones for dresses, ensembles and millinery for late afternoon and informal dinner and theater wear. The group comprises Snowblu and Foggy Blue, Cloudy Gold and Tobacco Bronze, Twilight Aqua and Greendusk, Rose Champagne and Terra Cotta Rose, Teagreen and Ripe Olive, and Winter Pink and Old Port. A group of eight "rustic tones" keyed in the medium scale especially adapted to casual town, country and travel clothes, included Mauveleaf, Blupine, Woodgrey, Forest Blue, Meadow Moss, Copperbark, Green Balsam and Foliage Crimson. The basic color range for town wear gives prominence to a group of twelve medium and dark tone-on-tones captioned Autumn Harmonies. In the neutral range are Sable Taupe and the lighter blending color Pearl Grége. Two grays are Cinder Grey and Graphite Grey; in the beige to brown family are Brown Chocolate and the sandy Nutria Beige. All of these go well with fur colors. New greens include Amandine Green and the darker Spinach Green. Bacchante Red, a spirited cardinal, Maroon wine, a Burgundy variety, Wild Blackberry, a blackish purple, and Ashmauve, a grayed color, complete the group. Eight vivid tropical colors, Colors Under the Sun, include Sea Turquoise, Indies Copper, Rico Green, Tropic Magenta, Haiti Red, Rio Sapphire, Burnt Gold and Solar Purple.

Tone-on-Tone pairs are featured also in the 1949 Fall Rayon Colors in two groups. Six pairs of harmonizing light and medium colors include Gentle Pink and Glacé Rose, Azure Cloud and Blue Dove, Sanblond and Patina Brown, Faded Lilac and Muted Mauve, Shadow Aqua and Nebulous Blue, and Limefrost and Olivemist. The other set of six pairs, medium and darker colors, include Mordoré Brown and the lighter Spiced Honey, Blue Flame and Carbon Blue, Fiberglow and Red Lustre, Dusty Jade and Frappé Green, Green Cedar and Sunset Green, and Silver Ice and Smoked Crystal. A very different note is struck by the deep and dusky "Dark-of-the-Night" Colors, comprising Chameleon Green, Midnight Purple, Autumn Wine, Nocturne Grey, Rose Acajou, Paris Taupe, London Green and Rendezvous Brown. Colors for formal wear are dramatized under the caption "White Tie" Colors and include Green Glamour, Gala Violet, Radiant Ruby, Sparkling Sapphire, Dancing Pink, Festive Emerald, Golden Starlight and Magnetic Red.

EGYPTIAN BLUE Since Egypt has been in the news lately, it is not inappropriate to continue our occasional historical notes about colors or pigments with one about Egyptian blue. In an anonymous article in American Dyestuff Reporter (26, 710-11; 1937), entitled "Spectrophotometric Identification of an Ancient Dyestuff," work by the Research Laboratories of the International Printing Ink Corporation is reported. The article begins with: "A remarkably permanent blue coloring matter which colored the tombs of the Pharaohs a thousand years before King Solomon built his temple was analyzed (spectrophotometrically) by industrial chemists. They found that in some ways this blue was similar to the present day pigment, ultramarine." (Incidentally, a picture of a young man before the Hardy-General Electric spectrophotometer busy on this job looks remarkably, when judged from a rear view only, like our Walter Granville, then twelve years younger. If we remember correctly, our puissant membership-committee chairman was then with IPI or the Interchemical Corporation with which it was related, leaving later to join Container Corporation of America.)

It was stated, after citing the several good fastness properties of Egyptian Blue, that in many ways it is inferior to existing blues; and its production would not be profitable today, though some samples 3000 years old were still brightly colored in 1937. This date fails by nearly two millenia to reach back to the earliest date, near "the dawn of civilization," given in the article for the time when the pigment was prepared and sold, namely "3000 B.C. -- long before the empires of Greece and Rome even existed." (The dawn of civilization, as we know it today, has recently been pushed back by archaeologists to something like 5000 B.C. in several areas of Asia.) In an article by E. M. Jope and G. Huse in Nature of July 6, 1940 (p. 26), the earliest date was given as Fourth Dynasty, beginning, according to it, at 2900 B.C.; but the noted authority, Professor Albright of Johns Hopkins, in 1942 gave the date of this Egyptian dynasty as the 26th century. Jope and Huse applied X-ray powder photography to the identification of this azure pigment which, according to the Maerz and Paul " Dictionary of Color," has a Munsell notation about 6 B 4/8.5. The two articles agree that it was used throughout the Roman empire, and one of them states that it was the same pigment as was popular in the days of Rameses and Tutankhamen (whose fabulously rich tomb was opened in 1922). By the X-ray method it was shown that crude frits from Tell el-Yehudiyeh in Egypt (known for a type of black pottery Juglet), from Silchester (Berkshire) and from Woodeaton (Oxfordshire) were of the same crystalline form as a block already prepared for trading at Tell el-Yehudiyeh, another in course of preparation at Armant (Egypt), and a pale blue finely powdered pigment on Pottery from Tell el-Amarna (the capital of the extraordinarily interesting pharaoh Akhnaton), and on wall-plaster frescoes from Woodeaton. A potsherd (pottery fragment) from the last-named place contained the same finely powdered pigment and was obviously used as a palette. According to the spectrophotometric method, fragments of a wall from the ruins of Pompeii near Naples were shown to be colored with the same pigment from known museum specimens and from Roman murals.

By the use of X-rays all of the samples were shown to contain essentially Cu, Ca and Si, with varying small amounts of Na. Laurie and others, in 1913-14, had shown that examples of a similar blue from Egypt, Rome, Knossos (Crete, early artistic center), Syria and Wroneter (Shropshire) consisted essentially of a definite compound of one equivalent each of the oxides of cupric copper and calcium and four equivalents of silica. This assumes the brilliant azure color only if formed between 800° and 900°C. (1472° and 1652°F); outside these limits the frit passes to a green glassy mass. Reconstruction of an Egyptian furnace has shown that maintenance of this temperature for several days was required. Probably the Egyptians were able to judge the temperature by the color of the glowing mass. The pigment was made from sand, lime, soda or natron and copper carbonate ore. The crude frits were found in the form of agglomerates of small balls about half an inch in diameter; and this agrees well with the description of Vitruvius, about 24 B.C., of the making of the pigment. He notes the biconical form of the balls from the rolling in the hands as prescribed.

Dr. Mary H. Swindler of Bryn Mawr, in her splendid "Ancient Painting" (1929), a copy of which we were fortunate enough to secure some years ago, on page 40, states that blue is not used in the earliest Egyptian paintings and seems to have been used later as an alternative for black. She adds: "It is very common in the Fifth Dynasty but was sparingly used in the Fourth and in the still earlier (well-known) tomb of Hesi-Re;

the few instances cited of it seem a bit doubtful." The method was tempera, not fresco. Lower on the page she says that the blues and greens were oxides of copper, but adds: "Blue was an artificial product, the color of which varied greatly from light green to purplish tones. In making it, white quartz (an improvement on sand -- Ed.) was ground to a coarse powder, mixed with alkali, lime and copper ore, then heated so as to combine without actually melting. The color depended on the amount of copper employed, the degree of heat used, the amount of lime and the presence of iron. Red sand (containing probably iron), for example, gives a greenish blue." The X-ray powder method will identify most pigments even in the finely powdered form in which the Egyptian blue appears in paintings. By this method was identified copper aluminate (CuO combined with one equivalent of alumina) as being responsible for the blue color on one pot from Tell el-Amarna. This, by the way, was the seat of Akhnaton, father-in-law of Tut, idealist, heretic pharaoh, patron of art, and first historical monotheist. He was called by Professor Breasted the "first individual of history." We may add that he was also the husband of the beautiful Queen Nofretete and the father of four daughters, with whom he often appeared in an entirely new, informal way. But alas, he was no better at war than the Egyptians of today. When his appointed governor at Byblus north of Beyrouth wrote more than fifty letters (cuneiform clay tablets since found) complaining of the attacks of the Habiru, probably related to the Hebrews, Akhnaton was too busy with his religious reforms to be bothered to send troops.

But to return to the pigments, if we have correctly identified Mr. Granville, perhaps he will tell us how useful is the spectrophotometric method of identifying pigments other than Egyptian blue.

I.H.G.

GRAF PAPER

Speaking of Walter Granville, we note that he and his company believe in combining utility with esthetic values, for we recently received from him copy of a very neatly printed gray spectral graf paper across the top of which a bright full-color spectrum was printed. It was apparently composed in the Design Laboratory of Container Corporation of America.

FEDEROV'S BOOK

In News Letter No. 66 (September, 1946, p. 4) we indicated that Mr. Alexander E. O. Munsell was busy translating N. T. Federov's "General Color Knowledge," published in 1939, from the Russian. Along with a Christmas card from Mr. Munsell we recently received a note saying that he was making progress translating selected portions of the book. The card, incidentally, reproduced in "black and white" a portrait of his mother, the late Mrs. A. H. Munsell, painted by Abel G. Warshawsky in 1940. The portrait shows her in characteristic busy pose -- for her mind was always active -- and through a window shows a bit of the nature which she so loved and illustrated in her flower work.

FARNSWORTH REPORT

We have received another of the series of reports from the pen of Lieut. Comdr. Dean Farnsworth, H(S), USNR, issued by the Medical Research Laboratory of the U. S. Naval Submarine Base, New London, Conn. It is entitled Standards for General Purpose Sun Glasses. It is Color Vision Report No. 17 of the series Theoretical and Bibliographical Studies in Audition and Vision, dated 10 September, 1948. This 27-page report, with 20 bibliographical references, contains the following conclusion: "Sun glasses can be rated in acceptability with respect to specific, measurable, designed characteristics. Ideally, they should transmit 12 % visible light, be uniformly spectrally absorptive, be opaque to infrared and ultraviolet, exclude peripheral light, be free from optical defects -- and these characteristics should be unaffected by usage. Practical realization of these qualities depend upon transmissive media, frame design, size of lenses and base curve. On page 2 is a Summary giving standards recommended under the following heads: Light, Heat, Ultraviolet, Neutrality, Size of Lenses, Base Curve, Geometric Optics, Frames and Physical Specifications; and in the following pages the experimental and literature bases for these recommendations are detailed.

HARRIS' EARLY COLOR CIRCLE

The ISCC Secretary in November received from our occasional but always interesting correspondent, Edwin M. Blake, a letter giving notes from a recent article by F. Schmid of Zurich, Switzerland, entitled "The Color Circles by Moses Harris." The letter was passed on to us by Miss Nickerson along with photostat of the four large pages of fine print and two pages of illustrations constituting the article. The former were pages 227 - 230 of vol. XXX, No. 3 (Sept. 1948) of The Art Bulletin, published by the College Art Association of America.

Moses Harris, 1731-85, entomologist and engraver, according to the article was best known for his book on English insects. His work on color was first published about 1770 (1766 or 1776) and has a very long title which begins with "The Natural System of Colours..." Schmid believes that he has the only extant copy of this book. A later (1811) edition, edited by Thomas Martin, is owned by the British Museum (one copy). Schmid's well documented and illustrated article gives the history of the arrangement of colors into systems (hue circles and color solids). At one point (p. 227-8) it says: "The color circle invented by Moses Harris rendered all older systems obsolete and I treat it here more fully because of its importance." The earlier ones, better known in part because of mention by Wilhelm Ostwald, include the work of Newton, Le Blon, Castel, Tobias Mayer and Lambert.

But Harris' work was known to several other authors in the color field. Indeed, according to Liberat Hundertpfund in his "The Art of Painting," published in London, 1849, the better-known color-table of Chevreul in his Law of Simultaneous Contrast of Colors was but a reproduction of a diagram by Harris which was quoted by Phillips in his Lectures on Painting. The diagram was also copied in W. B. S. Taylor's (1839) translation of Mérimée's "The Art of Painting in Oil." Harris' work was also mentioned by M. Gartside in an 1805 essay, by George Field in his "Chromatics" (1817) and his "Chromatography" (1841), and by Charles Hayter in the sixth edition of a comprehensive work published in 1845. As we have said, he was not mentioned by Ostwald in his account of the development of color theory since Newton.

According to Schmid, Harris identified his "primitives" (red, yellow and blue) by means of both pigments and flowers; likewise his three "mediates" (orange, green and purple). These are then elaborated into 18-hue color circles for Prismatic Colors and for Compound Colors, the total number of gradations and mixtures being 660, nearly the same as the number of colors (672) shown by Ostwald in 1931. Schmid quotes Harris to some extent on color harmony; but for his ideas there we suggest that you refer to Schmid's article.

SEQUENCE OF FASHIONS

Admittedly it is stretching a bit to include in color news notes on fashions devoid of mention of colors; but since colors are normally so important to fashion and the author has treated his subject so refreshingly, we include the following table. It is taken from The Journal of Photography (87 A 223; Oct. 1947) and was from the pen of James Laver; title: "Sequence of Fashions."

Fashions seem:

Indecent	Ten years ahead of their time
Daring	One year ahead of their time
Chic	In their time
Dowdy	After one year
Hideous	After twenty years
Ridiculous	After 40 years
Amusing	After 60 years
Romantic	After 100 years
Beautiful	After 120 years

Cannot now some imaginative color expert give us the list of adjectives used in the description of the cycle of color usage?

JENA COLORED FILTER GLASSES

In a note received about a week after our November issue had gone to press, we were informed by Murray Yawitz, Sales Manager of Fish-Schurman Corporation, that they are again in a position to furnish Jena colored optical filter glasses produced in the American Zone in Germany. He states that their factory is now in a position to duplicate all the filters listed in their catalog. Information about the catalog and filters may be obtained from the company at its address at 230 East 45th Street, New York 17, N.Y.

COLOR NOTE ON SCARLET

When I am dead,
I hope it may be said:
"His sins were scarlet,
But his books were read."

-- Hilaire Belloc, Sonnets and Verse
p. 147 (Sheed and Ward, New York)

The Editor recalls saying something to the same effect about the News Letter when he took over the editor's job late in 1936, under the title "A Hueful Talk to You," and repeating this Apologia in the September, 1947, issue over a decade later. But judging from the volume of bouquets received by the editors recently, we begin to think that perhaps now we need not be quite so scarlet. What hue or color do you suggest? (Of course there will still be problems to settle, after we have your injunctions as to color, if the associate and chief editors differ among themselves as to the magnitude of the color tolerances.)

I.H.G.

GENERAL ANILINE-LIBRASCOPE TRISTIMULUS COMPUTER

At the March 10-12 meeting of the Optical Society of America, two papers will be read dealing with the design and operation of the new rapid, high-precision tristimulus integrator built by Librascope, Inc. of Burbank, California, according to the original design of the Physics Section of the Central Research Laboratory of General Aniline and Film Corporation. It is planned to have the instrument available for demonstration at the meeting, and to offer it for sale commercially shortly thereafter. The instrument has been designed to fit snugly into the Hardy-General Electric Recording Spectrophotometer, and few and slight changes in the spectrophotometer need to be made to adapt the integrator to it. The computer integrates continuously in the range 400 to 700 mu while the spectrophotometer is in operation, and records the final tristimulus values X, Y and Z directly on counters with no additional time required. Because of its continuous integration it may be expected to be more accurate than methods involving selected ordinates in the cases where there is any unusual inflection in the reflectance or transmission curve between two selected ordinates.

Even the preliminary "bread-board" model of the instrument appears to operate with high precision, the accuracy depending primarily upon the accuracy with which the cams are cut. When the value of Y is normalized to equal unity for a completely reflecting sample, the precision of the tristimulus values is expected to be ±0.005 or better. The average differences between the chromaticity coordinates x and y for A. M. and P. M. repeats of measurements and computations on six red wool dyeings was 0.004. This includes the overall errors due to the spectrophotometer itself, the smoothing of the samples under the pressure of the sample holder and those of the integrator. In other experiments with dyeings, also using the preliminary model, it was found that the integrator could be used to obtain a measure of the "unlevelness" (lack of uniformity over six-inch-square pieces); and the improvement of levelness can be followed as "levelling agent" is added to the dyeing bath. No significant change could be detected when the Recording Spectrophotometer was used to measure the transmission of a didymium glass at slow (5 min.) and rapid (2.5 min.) speeds.

A paper on the design of the instrument will be read by Hugh R. Davidson and L. W. Imm, who were responsible for the original design. A paper giving some of the above-indicated results on precision and applications will be read by I. H. Godlove. Results will be reported which indicate that the Recording Spectrophotometer is adequate for small-difference colorimetry when combined with the new Tristimulus Computer. Since the integrator is coupled electrically directly to the cams of the spectrophotometer, all errors due to inaccuracy of graph paper are absent, and the uncertainties of reading overlapping pen curves are eliminated. Some results comparing the performance of the eye and the instrument will be reported.

The cams were cut to give tristimulus values for daylight (Illuminant C); but a liquid filter has been developed to give approximate analysis for night lighting too (Illuminant A). Further work in this direction, using more permanent or convenient filters, and the possible cutting of cams to be used alternatively for this purpose, is under way. The engineering experience of Librascope, enhanced during the war in connection with apparatus for calculations involved in fire control, is apparent in the compactness and engineering "Know-how" of even the preliminary model.

I.H.G.

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Color coordination in variety merchandise*

By HELEN D. TAYLOR
W. T. Grant and Company

Excerpts from paper presented at 17th annual meeting of the Inter-Society Color Council in New York City at a symposium on Color Coordination in Industry

COLOR PLANNING is one of the fine things that an American company is doing for its customers. It is quality and beauty and correctness for people with small incomes. . . . This great group of people have a steadily developing knowledge of quality, a new-found sense of beauty and discernment that grows with our steadily increasing standard of living. It is very worthwhile to give them merchandise as good in quality, color and design as can be achieved within the price limits. . . .

The Grant Company operates 486 stores in 39 states and had in 1947 a yearly volume of $228,000,000. The stores range in size from the first little one in Lynn, Massachusetts, to the magnificent new store in Syracuse, New York, which is a variety department store carrying merchandise in the higher price brackets as well as the lower ones. In the stores of the Grant type the merchandise is displayed in full view on open counters and racks and shelves —all where it is easily seen and handled by the customers. This is enticing to the customer but hard on the merchandise. A successful department must move its goods fast, before it becomes soiled, or worn or unseasonable. This is the point of sale. The customer must like the goods when she gets it home and it becomes part of her life. This is the point of use. Both must be right, and the color planning is concerned with these two points. . . .

The Grant (color) standards are in the process of being developed. The color program was started a little over a year ago, and the color survey was made first in the home furnishings field. A wealth of material was collected and analyzed. Past selling, present demand and new developments in color and design have been carefully classified and evaluated. The Grant sources and buying staffs cooperated in this survey in every possible way, giving generously of their time and experience. . . .

The color story was presented to a meeting of regional managers in March of 1947 at which the buying staffs were present, and the color books were distributed. The plan was to make a trial use of the colors for a year and then in March of 1948 to survey them a second time and make further adjustments before Mr. Foss made the final set of standards. We are now preparing this last set-up and will be able to eliminate some of the colors and substitute others that are more needed. Some of the groups will be lengthened and others will be shortened.

During the year of trial some of the departments have moved into their permanent color standards before waiting for this March checkup. The paint departments have finished their color work and have their new color lines in the stores. The kitchen colors were not well represented in the general home furnishings group so a special set was made and is now in its permanent form. These colors are being used for utensils, oilcloth, curtains, aprons, plastic dishes, cutlery, towels and so on.

Outdoor furniture was another special set of colors.

The home furnishings colors fall into two natural groups. Number one is the Traditional and volume group of colors—soft-toned, gently harmonious with each other—familiar and well-loved because they are part of our inheritance. These are the colors of the early Americans' used in their homes and public buildings—colors easy to obtain with the then available materials—colors that were past memories of the lands for which they had sprung. . . . They are safe colors: cream, écru, buff, tan and brown homespuns, Colonial blues and greens, roses, warm yellows, Federal golds, berry red, earth reds, and wine reds. They wear well, age well, and are American.

The second group is Modern, strongly influenced by California and our Latin-American neighbors. These are strong, clear colors, holding their own in bright sunlight and brilliantly-lighted interiors. They are good with shining metals and the new light wood finishes. They are sun, and sea, and sky—colors of a new way of life—game rooms, theatres, night clubs, glass and chromium homes, streamlined trains and planes—they are clear colors with bright harmonies: lemon, lime, chartreuse, coral, cherry, turquoise, and two neutrals, gray and mushroom.

Application and methods of procedure

Buyers work directly with their sources. The colorist enters only on request of buyer or source. The final responsibility of the sale rests with the buyer and it is most important that he handle every color operation, asking for assistance only when desired. This procedure has worked well in the W. T. Grant Company and the color program has moved with great speed due to excellent cooperation, and to the leadership of the key men in the various divisions. . . .

Conclusion

We have ahead of us the working out of our color standardization and control—not a static but a living thing that changes with time and taste—that from time to time requires adjustment so as to be up-to-the-minute on the Grant counters. . . .

This is not a new story to American business as a whole because there always has been a color factor in the successful sale of goods. But it is news when W. T. Grant, operating in the variety field, plans to gives its customers fabrics and furniture, china and glassware, kitchen equipment, clothing and accessories in the best colors and designs that styling, science, and art can produce at a given price.

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Color Organization in

THE OSTWALD SYSTEM

by

WALTER C. GRANVILLE

Color Standards Department, Container Corporation of America

THERE are two principal reasons for the existence of color order[1] systems. They aid in the *selection* and the *description* of colors in the ways shown.

selection — to think about relationships between colors, to choose for various purposes, to find one's way easily in the color world.

description — to keep a record of color choices, to tell someone else what the color looks like, to provide basis for reproducing color and to set up color tolerances.

A necessary feature of such a system is a set of color chips that visually illustrate its principles. Color chips are needed for seeing and for understanding the relationships that are important and useful among colors. Also, chips are required to provide visual experiences when experimenting with color harmonies, and for the communication or discussion of color choices with other people. The principles of color organization determine whether or not colors can be found and chosen with ease, and if the system will help with these kinds of color problems.

If the color chips representing the system are prepared with sufficient accuracy and precision, then and only then should they be called "color standards." This care in preparation insures that chips bearing the same notation are alike in color. If the chips labeled alike are not alike in color, it is obvious that confusion and misunderstandings will occur.

Thus, there are two factors which are most important:

a) the principles by which all colors are organized into orderly arrangements, and

b) a set of color chips representing these principles.

A system of color order which meets the qualification of simplicity in organization, both in theory and in use, was developed by Wilhelm Ostwald (1).

This system has been represented by several productions of color chips, the most recent of which is contained in the Color Harmony Manual (2). The chips in the Manual do qualify as color standards because of the care used in their preparation and their subsequent colorimetric standardization (3).

The purpose of this article is to describe the elementary facts concerning this color system[2] in simple, nontechnical terms, and to show how it can be applied to some of the problems encountered in the Graphic Arts.

How the Colors Are Organized

The organization of the colors in the Ostwald system is so simple as to be almost self-evident. The basis of the order is an equilateral triangle in which white, black and a fullcolor are located at the points, as shown in

*This article is a revision and enlargement of one which appeared under the same title in the July, 1947 *American Printer*.

1 The word "order" is included here in the term "color order systems" to emphasize the order or organizational aspects of the system and to make a distinction between the one here discussed, and others (such as the 1931 International Commission on Illumination Standard Observer and Coordinate System for Colorimetry) concerned primarily with color specification.

2 Certain modifications of the original Ostwald concepts were used in developing the color chips in the Color Harmony Manual. The basis for some of these modifications is described elsewhere (4) by Foss, Nickerson and Granville.

Fig. 1. Corresponding color notations for each position in the triangle are shown in Fig. 2.

A series of neutral grays with white at the top and black at the bottom is shown in the longest vertical series. The fullcolor always is located at the other end point in the triangle and notated *pa*. Combinations of the fullcolor with white and black show the variations obtainable in a single hue.

Series of colors become important either because most people inherently like and use the colors shown, or because the relationships between the colors in the series are easily understood. One of the best features of the Ostwald triangle is the elegant simplicity with which three such series are shown.

The *light clear* series shown in Fig. 3 contains the colors shown in the positions between and including the full color and white. These colors are commonly called tints, since they are modifications of a fullcolor with white.

A second series also shown in Fig. 3, consists of the colors shown in the positions between and including the fullcolor and black. Ostwald named this series the *dark clear* series. More commonly, these colors are called shades.

The colors in each vertical series comprise what Ostwald called a *shadow* series. They are useful because they illustrate a color effect which is continually occurring in our field of vision. A shadow series illustrates the color change a surface undergoes when thrown into shadow. For instance, as the top member of any *shadow* series is placed into deeper and deeper shadow, its color will progressively be the same as the chips underneath it.

White, Fullcolor and Black

Let us see exactly what is meant by the terms white, fullcolor, and black, because definitions for these terms used here differ somewhat from those given by Ostwald in his original writings. In the Ostwald system, as discussed in this article, *white* is represented by a color chip having the highest reflectance obtainable, and *black* by a color having the lowest reflectance obtainable in the medium with which the color chips are made. The term *fullcolor* refers to a color chip exhibiting the maximum purity obtainable in the medium.

The colors shown for the positions between fullcolor and white (the light clear series) and between fullcolor and black (the dark clear series) represent the maximum in purity that could be obtained for each hue.

In the Color Harmony Manual, the color chip medium was a pigmented lacquer, and the colors obtained were the most saturated that could be achieved with pigments of maximum permanence.

Hue

In each Ostwald triangle, all of the colors are meant to have constant hue. Since the word *hue* is subject to several meanings, a further explanation seems desirable. In technical terminology, the term "dominant wavelength" is a synonym for hue as used in the Ostwald system. The colors in each constant hue triangle have the same dominant wavelength.

Another method of describing or obtaining colors having the same dominant wavelength is through the use of Maxwell discs. If discs of white, fullcolor, and black are placed on a disc spinning motor, the dominant wavelength of their mixture, while spinning, remains constant regardless of the fractional areas of the three discs used. Therefore, once the hue of the fullcolor is known (either in terms of the Ostwald hue or the dominant wavelength), the hue of all variations with white and black also is known.

The Ostwald triangle in Fig. 1 has been shown only in one hue. However, the triangular arrangement can be applied to any number of hues. In the development of hue circles, two principles have been found useful. These are:

a) assignment of complementary[3] hues to opposite positions on the circle, and
b) assignment of visually equidistant hues to neighboring positions on the circle.

Both principles cannot be illustrated simultaneously in a hue circle.

[3] Complementarism is strictly maintained only for the kind of light under which the color chips were made, which was average daylight (I.C.I. illuminant C.)

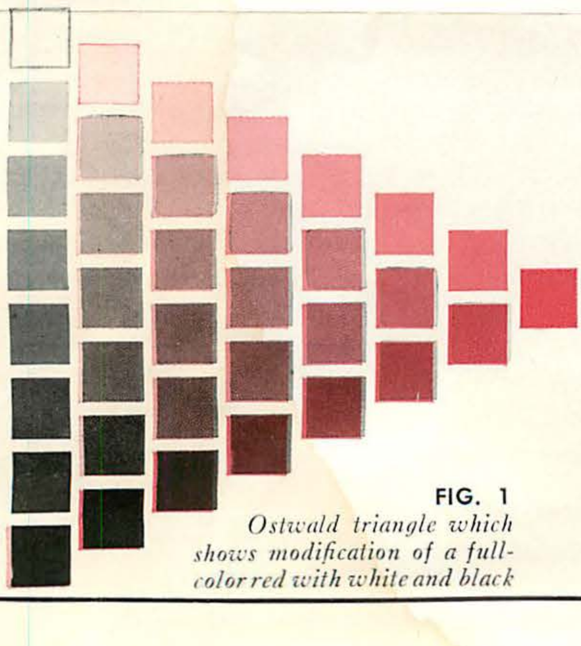

FIG. 1
Ostwald triangle which shows modification of a fullcolor red with white and black

a
ca
c ea
ec ga
e gc ia
ge ic la
g ie lc na
ig le nc pa
i lg ne pc
li ng pe
l ni pg
nl pi
n pl
pn
p

FIG. 2
The Oswald method of notating the various positions in the triangle. In this abridged form, every other letter except j *is used. Positions in between those shown can be notated by using all letters in the alphabet from a to p.*

tained in two-color printing, where the inks match the fullcolor and black discs, and the paper stock matches the white disc.[5]

The Ostwald triangle can be used to obtain a good approximation of the range in color for this kind of two-color printing. If the chromatic ink matches the fullcolor chip, and the black ink matches the black chip and the paper is a good neutral white stock, then the colors obtainable with various halftone or Benday screen combinations are shown in the Ostwald triangle having the same hue as the fullcolor ink. This is illustrated in Fig. 1 in which the printed colors correspond quite closely to the color chips in the Color Harmony Manual for hue 7.

The light clear series in Fig. 3 was produced by varying the fractional areas of the fullcolor ink. The dark clear series was obtained by varying the fractional areas of the black ink over a solid of the fullcolor ink.

The colors of a single hue triangle may not always look as though they belong in the same hue family. Nevertheless, the variations obtainable with a fullcolor and a black ink on white paper, by letterpress or lithographic processes of printing, are limited to those shown in a single Ostwald triangle, in which the fullcolor ink corresponds to the *pa* chip. Colors shown by the light clear and dark clear series represent the maximum purity obtainable at each level of lightness. This shows the artist and the printer the limitations encountered in two-color printing, as well as the maximum color gamut to be expected.

5 This correlation fails to be completely rigorous only because the printed ink film varies in thickness with the size of the dot, and also in different areas of the dot. Ink film-thickness is a factor here because the color of an ink varies with film-thickness. Some pigments exhibit this to a greater extent than others. For instance, while two red inks may match when printed in solid areas, their highlight screens (tints) may differ considerably in hue.

Summary

Ostwald, in his study of color, developed theories he believed were interrelated and which provided answers to most color problems. Recent studies, using modern procedures for color analysis and measurement, have brought forth clarification of some of these ideas. His method of color organization based on an equilateral triangle, is particularly well-suited for many kinds of color work, and is being used to an ever-increasing extent.

Acknowledgement

The author wishes to thank Mr. Egbert Jacobson for the use of the illustrations in Figs. 1 and 3, which appear in his forthcoming book "Basic Color" to be published by Paul Theobald. Helpful criticism of the manuscript by Miss Katherine Chandler and Mr. Jacobson is appreciated.

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for any other hue and then depart from that chip in the vertical and the diagonal directions, as was done before. An obvious choice for maximum hue contrast would be the complement, but other hues may be used without restriction. In this way, neighboring hues, triads, split complements and other geometrical divisions of the hue circle can be developed.

The basis of these rules for harmony is to maintain an orderly relationship between the various colors. These can assume many types of order. However, the preceding rules should not be thought of as restricting or limiting selections. They are merely starting points which provide color ideas that may be critically studied.

If it is desired to ignore all of the suggested rules for color harmony, the Ostwald system still provides a very useful tool for developing harmonics. This is because the triangular arrangement of the chips makes it easy to move around within the color solid, and to select independently of rules, the colors which are believed suitable. This system serves as a set of color standards for general use, and in the form presented by the Color Harmony Manual is exceptionally well-suited for this purpose (7).

In the Ostwald system, the colors are not organized according to constancy in lightness.[4] They are organized according to orderly progressions made up in part by differences in lightness. The size of the lightness step between neighboring chips varies throughout the triangle. The largest steps are obtained between colors in the vertical (shadow) series where the colors differ only in lightness.

In the scales running in either of the two diagonal directions, the color difference between neighboring chips consists of a lightness and a purity component in varying proportions. The size of the lightness component depends on the lightness difference between the end colors of each series. For example, the lightness difference

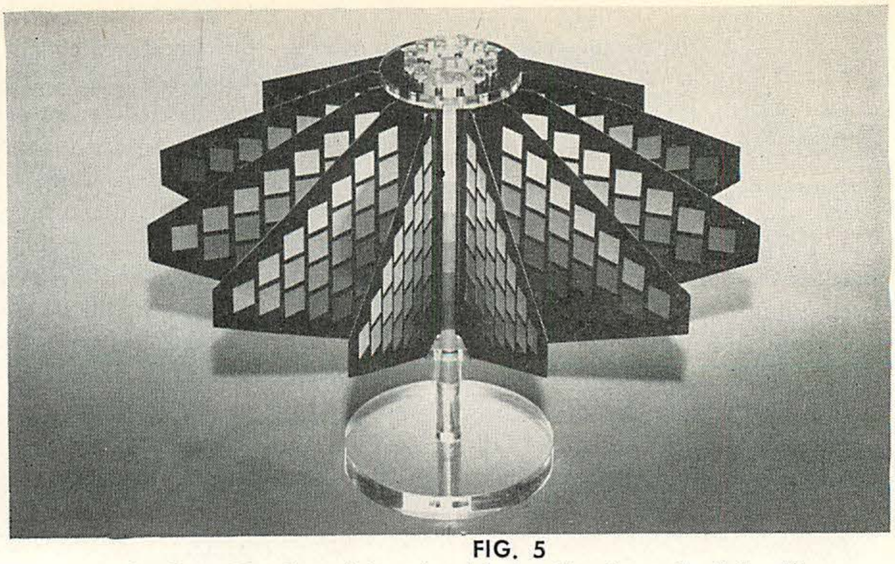

FIG. 5

An Ostwald color solid made with the chips from the Color Harmony Manual. A different hue is shown on each side of the 12 leaves.

between the chips in the light clear series for yellow hues (hues 1 & 2) is very small, while for the corresponding series in all other hues, it is much greater.

The fact that the triangular arrangement provides a difference in lightness between all of the colors in each triangle is more often than not a useful feature because color combinations using colors of equal lightness are seldom seen. Nearly always, some lightness contrast is not only desirable but also necessary. This is particularly true in the graphic arts where good visibility of a design such as type, requires an adequate amount of lightness contrast between the foreground and background colors.

Application to Printing

When an illustration is to be printed, it is helpful to have a color chart which shows the color gamut obtainable with the printing process to be used. With such information, the maximum use of color in design can be made, and a number of printed color charts have been produced to show the color range for three-and four-color printing by the halftone process.

In the case of one-and two-color printing, the experiment with Maxwell discs described previously has special application. The range in color obtained by disc spinning of a white, fullcolor, and black in various disc fractions is similar to that ob-

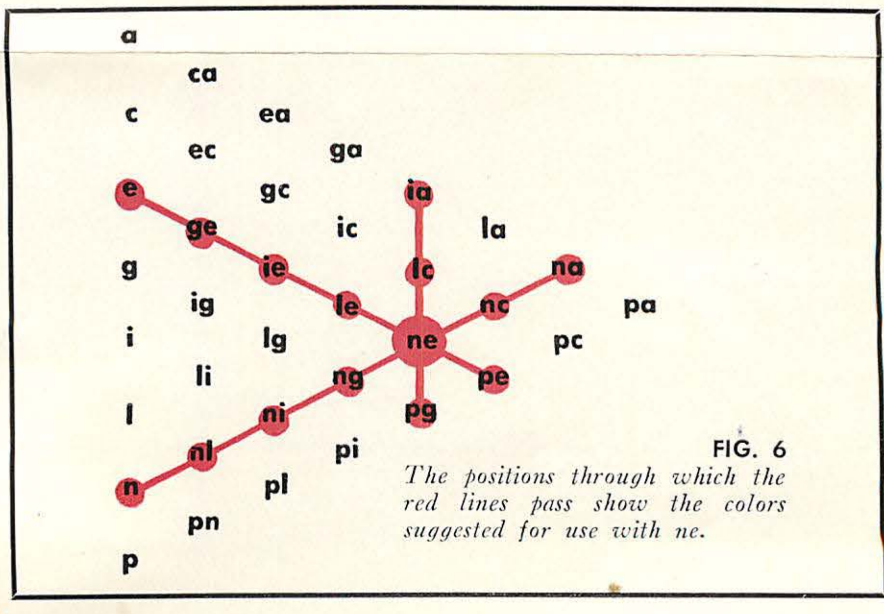

FIG. 6

The positions through which the red lines pass show the colors suggested for use with ne.

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[4] Lightness is a synonym for "reflection factor" or "value" and is used to describe lightness or darkness variations between colors. Thus, if two colors have the same hue and purity (such as any two colors in a shadow series), but one is either lighter or darker than the other, the colors are said to differ in lightness.

If one principle is followed, the other must be sacrificed to some extent. This was pointed out by Von Bezold (5) in 1876.

Ostwald chose to follow the principle of locating complementary hues at opposite positions in the circle because he believed this feature to be more important. While this required some sacrifice in the equality of the visual intervals between adjoining steps, there is ample justification for the decision. To mention one reason, most of the important literature on color harmony uses the principle to describe and select hues that are opposite one another, and hues that offer maximum contrast.

Ostwald originally started with 100 hues, but later limited the number to 24 to provide twelve pairs of complements, as shown in Fig. 4.

The color order provided by a combination of the hue circle and the triangle can be shown in a three-dimensional form, called a color solid. It is made by placing the 24 different hue triangles about a vertical gray scale as in Fig. 5. Since there are 28 colors in each hue, a total of 672 (24 x 28) colors are shown in this solid. Experience has shown that this is about the minimum number needed for most color work.

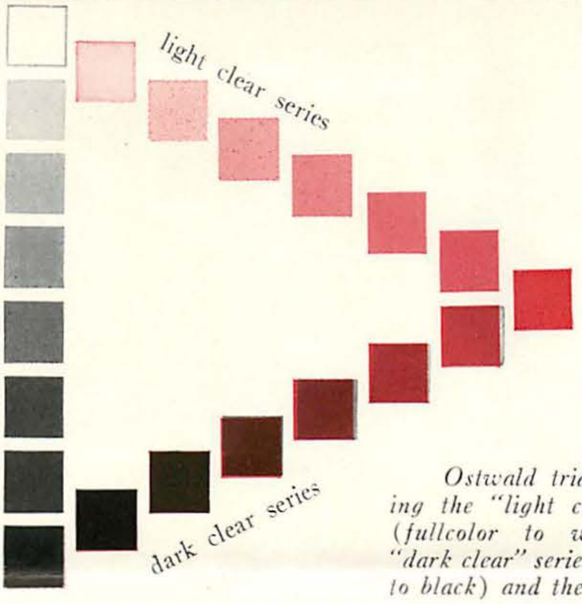

FIG. 3
Ostwald triangle showing the "light clear" series (fullcolor to white), the "dark clear" series (fullcolor to black) and the gray scale.

Developing Color Harmonies

Achieving color harmony is a complex problem and is not dependent just on selecting colors that look well together by themselves. Color harmonies are developed for a particular purpose, perhaps to make the individual feel happy and content, to improve appearances, or to sell a product. The principal factors which should be considered for the last purpose have been nicely stated by Harry V. Marshall (6) as follows:

"In merchandising, the selection of suitable colors should be regulated by three considerations—the article we are selling—safety pins or steamships, tomato soup or cosmetics; to whom we appeal—men or women, children or corporations; and the manner of presentation—posters or periodicals, catalogs or containers."

From the above it is evident that rules for color harmony can only suggest colors that are related to one another in an orderly way which is applicable to our needs. Suggested harmonies will be found by selecting colors from positions in the triangle, or in the color solid, which are related to each other in simple geometrical patterns.

Suppose it is desired to obtain suggestions for colors that will go with the color represented by the *ne* position in the triangle. Colors that are related to *ne* will be found in the vertical and the two diagonal scales as illustrated in Fig 6. All of the positions intersected by the three red lines passing through the *ne* position may be used with *ne*. The same procedure of departing from the starting position in the vertical and the two diagonal directions may be applied to any other position in the triangle.

The suggested colors so far obtained are of the same hue; that is, they were taken from the same triangle. If colors of a different hue are desired, it is only necessary to go to the same position (*ne*) in the triangle

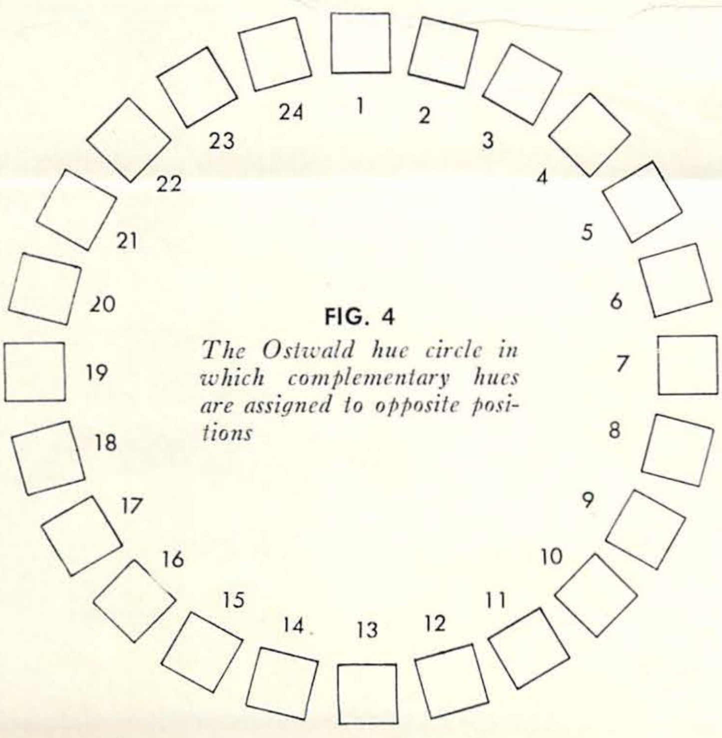

FIG. 4
The Ostwald hue circle in which complementary hues are assigned to opposite positions