INTER-SOCIETY COLOR COUNCIL
NEWS LETTER

NUMBER 136 July, 1958

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NEW MEMBERS The following applications for individual membership were accepted at the last Board of Directors' meeting held on June 11, 1958.

Associate Individual Members	Particular Interests:
Professor Leland H. Brown Illumination Laboratory Stanford University Stanford, California	Maximizing small color differences by use of suitable light sources. Lighting for the optimum display of colored objects, photographic techniques for the most exact color photography. Accurate color specification for flowers.
Mrs. Sheila Chapline New York School of Interior Design 29 East 72nd Street New York 21, New York	Color as related to its use in interior design, its relation to lighting as well as paint mixing and new paints available.
Mr. Eugene W. Commery General Electric Company Nela Park Cleveland 12, Ohio	Correlations of color surroundings in residential interiors and the likes and dislikes of people for their surroundings. Also the visual interpretations of color areas as used in interior design.

Mr. J. Gordon Hoffman
c/o Hoffman Engineering Corp.
183R Sound Beach Avenue
Old Greenwich, Connecticut

Measurement of small color differences and brightness measurement of colored light sources.

Mr. Andrew G. Lang
Champion Paper and Fibre Company
Hamilton, Ohio

Color specification, color difference measurement and analysis, illumination and visual color problems.

Mr. J. S. Luck
c/o Aluminum Laboratories Limited
Post Office Box 84
Kingston, Ontario, Canada

Selection, specification and matching of color as it appears in a dyed anodic film on aluminum.

Mr. Bela A. Silard
Photovolt Corporation
95 Madison Avenue
New York 16, New York

Instruments

<u>Affiliate Individual Members</u> — <u>Particular Interests</u>:

Mr. Hugh Campbell
Canadian Industries Limited
Paints Division
1300 Castlefield Avenue
Toronto, Ontario, Canada

Color Trends, color psychology, scientific proof of the beliefs that men like cool colors and women like warm colors, etc.

Mr. Richard A. Chapel
4501 Curtis Avenue
Dearborn, Michigan

Color bracketing, controlled lighting, new color developments.

Mr. Ralph S. Noble
829 Fifteenth Street
Denver 2, Colorado

Color relationship to sales and merchandising, color therapy, color and texture, color and industrial lighting.

Mr. Donald A. Pace
Plywall Products Company, Inc.
Post Office Box 625
Baer Field
Fort Wayne, Indiana

Public reaction to color through day to day living.

Mr. Marion V. Rhoades
Johns Hopkins University
Applied Physics Laboratory
8621 Georgia Avenue
Silver Spring, Maryland

Methods of study for color identification.

Mrs. Barbara Verrinder
531 Hazel Drive
Corona de Mar, California

Psychological response to color mass - in any field. Analysis of color differences. Trends and shifts in "public taste" in color design. I am intensely interested in anything where color is a factor. Have had success "guessing" home-buyer's whims in interior-exterior paint colors, counters, floors, papers, etc.

A.I.D.'S COLOR FORECAST FOR FALL OF 1958

The first semi-annual Color Forecast from the American Institute of Decorators Educational Board, Inc., designates yellow and yellow-green as the top lead colors for Fall, 1958 home furnishings.

This marks the first time that A.I.D. Educational Board has devised and endorsed a home furnishings color program. Selection of the two colors was made in cooperation with Color Key, Inc.

Selection of this Fall's colors was made by a vote of over 1500 members in 27 chapters of the American Institute of Designers. The A.I.D. Color Forecast will be sent to manufacturers and retailers in all areas of the home furnishings industry who participate in the program. The next Color Forecast will be for the Spring of 1959.

INDUSTRIAL DESIGNERS INSTITUTE

Each year the INDUSTRIAL DESIGNERS INSTITUTE awards three coveted medals to outstanding industrial designers who are substantially contributing to the betterment of living through design. The 1958 awards were presented to: MELVIN H. BOLDT, ASID, for the design of the AMI Portable Washer for AMI, Incorporated. S. M. Highberger, of Harley Earl, Inc., for the design of the "Secretary" Model Thermo-Fax Copying Machine for Minnesota Mining and Manufacturing Co., and EERO SAARINEN, Eero Saarinen Associates, for the design of the Pedestal Group for Knoll Associates.

LEATHER COLOR GUIDE FOR FOOTWEAR FOR THE SPRING AND SUMMER OF 1959 TANNERS' COUNCIL OF AMERICA

Fashion continuously stages revolutions. Indeed fashion must always have a moving front, for its success depends on newness - on the excitement of newly developed colors, designs, patterns, and silhouettes - on promotion and presentation - on publicity - and on dramatic staging and imaginative fanfare.

The sacks, trapezes and the chemise are by now familiar to everyone for they are to be seen everywhere. In spite of an avalanche of protests against the new looks (especially by men who do not like changes) nothing has slowed the mounting successes of the free form silhouettes and they will be the spark plugs for mounting sales in all accessories.

Footwear was ready and waiting for the free form look. The footwear designers have moved steadily ahead of the fashion front and they were the first to break the barrier - the slender forms, the graceful new heel heights, the zephyr weights, and modern art colors blazed the trail and many a customer bought the free form dress to go with her adorable new leather shoes.

Women's footwear for Spring and Summer of 1959 will find ready and waiting the whole color palette of the most beautiful leathers that the world has ever seen. Designs will be slender, elongated, and fit the foot like a second skin. The mid heel will be top fashion for town or country or for dress up times. Toes will be stiletto, tapering and long toes snipped off square. Shoes will be cut higher in front, closed toe will be seen with open backs which will be a cut-out heel with a narrow top band and the V-shape open vamps will show off straps, tiny buckles, and buttons.

More than ever the new leathers will be as light as thistledown, cool as a Summer breeze and will retain their remarkable strength, resiliency and enduring wearability.

The names of the leather colors not only sound interesting - they are interesting but too numerous to mention in the News Letter. However, here are a few intriguing colors: "White Shoe White" will be in every type of leather and pattern, for all times of day or night and will prove to be a versatile accessory. The Neutral Beiges will be BURLAP, CAFE au LAIT, and NOUGAT. The Sun colors sound like fun colors with YELLOW TULIP, GOLD, SUNDOWN, and HOT ORANGE.

The new Greens are nature's own perfect colors, and are just about the newest looking footwear colors. SALAD GREEN is light, crisp and clear. MAD GREEN is strong and clear and slanted to the blue. OSAGE GREEN is an attractive soft gray-green color.

FLIGHT BLUE is a classic in all tannages -- a Spring perennial while red keeps pace with SCARLET, TORRERO a new red with a high intensity and BASQUE RED will be the basic spring and summer red.

1959 Summer footwear for men is moving into perfection with flexible, light weight and air-conditioned shoes. The designs are trim, slender and foot-fitting with the cut somewhat higher. The newest look of all is the squared-off toe. As always the leather colors fit well into any style and color group of the fashion divisions and the Tanner's Council devoted several pages of exciting color names and descriptions in their recent news release.

NATIONAL PAINT, VARNISH AND LACQUER ASSOCIATION 1958 COLOR SURVEY

The Association has again published its wonderfully done survey of paint sales for the year! Note that this is a historical summary of paint sold, not a forecast of next season's for next year's most popular colors.

The Survey is commendable not only because of its thorough treatment, but also because of its obvious concern for accuracy. The Munsell system was used in this study to give the colors a universal language. The 1957 figures are percentaged and classified on the basis of this system.

To improve accuracy and eliminate much of the human probability for errors, a Color Difference Meter was used to classify colors. Colors were classified as dark if they have a value of 1 through 3 on the Munsell value scale, medium if they had a value of 4 through 6 and light if they had a value of 7 through 9. Colors having a chroma of less than 1 were classified as neutral grays.

White still constitutes about 45% of sales, light colors about 35%, middle values 10%, and dark colors 5%. Of the chromatic colors, greens continue to maintain a healthy lead.

The body of the report contains sales data on All-Purpose Enamels, Latexes, Exterior and Interior Flats. Each category is divided into hue increments 1.5-, 2.5-, 5.0-, 7.5-, and 10.0-. Value and chroma categories increase by whole number increments.

In a letter, Everett R. Call, Director Marketing Research and Statistics Division, stated that single copies of their Survey are available on request from the National Paint, Varnish and Lacquer Association, 1500 Rhode Island Avenue, N. W., Washington, D. C.

WILFORD SEYMOUR CONROW
1880 - 1957

The reputation of Wilford Seymour Conrow as a master in the fine arts is known to everybody. But it is not from this aspect of his crowded life that he is here celebrated. This note of praise is sung because of his contributions to fine arts matters much more mundane.

Beginning in his thirties and with his return from the camouflage division of the United States Army, he purposed an improvement in the economic status of the American artist. Working through the American Artists Professional League (he was its national secretary from 1928 to 1950), he accomplished much. Early in his crusade, he developed a slogan: "I am for American art." The cry seemed a bit chauvinistic but it was not really so meant. Its design was one more patriotic in character and a direct invitation to the American patron of the fine arts to come in and help. He was bidden to look about him and to observe for himself that many a competent painter in U S A was without commission -- and hungry. Would not the patron, be he individual or government, do something about it? He did, and with such effectiveness that today the American artist is no longer "the forgotten man."

When this century opened the Impressionists had taken over, by adding color to their antecedent nut-browns. The beauty of their pictures made the artists and the buyers thrill, but it also made them increasingly careless of the composition and the nature of the chemicals they handled as paint to accomplish their ends. Böcklin summed up what was the matter: "Modern pictures have not lasted centuries. To these old masters we must therefore return."

Conrow took on this challenge.

Beginning with Perkin in the 1850's, the tar barrel dyes had come in. Since his day their number and their beauty had steadily increased. The trouble about them was that their pristine brilliance so much wanted, quickly faded, so to distort what the artist had said originally. This did not matter when the product desired was for a spring hat, an evanescent stage setting or a billboard; but it mattered much when it concerned the family portrait. It made Conrow search for a selection of pigments for the palette of the fine arts painter which would withstand the ground painted on, the surrounding atmosphere and any interaction between the pigments themselves. He counselled the painter to lay greater emphasis on the permanency of his canvases than upon any color effect immediately more pleasing.

But where get the pigments, for example, needful to his ends? Where the American painter did get them at the turn of the century was out of France, Germany or England, a choice determined chiefly by the fact that the artist had studied in one or the other of these countries. He could not "buy American" simply because that market did not exist. The situation impelled Conrow to go seeking on his own, and so to arrive at a set of addresses where might be purchased here, pigments, binders and grounds as good as any to be had out of Europe. Commercially said, he broke up a monopoly. In the 1920's, as informed by friends, ninety-five percent of the fine arts materials needed by the American painter still derived from Europe, and only five from local source. The labors of Conrow turned these figures about. At the same time the cost of high grade art materials was cut in half, thus to lighten the financial burdens of the art student, the art school and the scholarship.

Yet another item of value was gained. The artist could now proceed in confidence, assured of the composition of his paints by noting what the label said. Misbranding went out when the manufacturers thus accepted in principle -- and in conscience -- what are the standards of the U S A's pure food and drugs act.

I apologize here for the need to insert a personal note. It was in 1930 that Conrow and I first met. I had just published a book called The Permanent Palette, and Conrow had found it good. It fitted well into his total problem of aid to the American artist, on which account he had inquired, would I come to New York for some lectures aimed at giving the artist a better understanding of his craft and of the materials he employed. The American Artists Professional League stood sponsor, and under its protection a series of lectures was given in the Metropolitan Museum. Their substance was then brought out in pamphlet form, intended for distribution to and guidance of the working and thinking artist.

One of my favorite philosophers asks: "Of what use knowledge if you do not employ it?" From the mere mechanics of its build to the soul-stirring product called a picture, Conrow did just this!

None ever labored harder for the declared aims of the Inter-Society Color Council than Wilford Seymour Conrow. As the Old West would put it, he died "with his boots on," pleading until the end that the fine arts painter consider scientific principle and employ it to direct his practice.

Dr. Martin S. Fischer
University of Cincinnati

Note: Dr. Conrow brought the AAPL into the ISCC in 1941 because of recognition of the need for using color specification in connection with furthering applications of the palette of permanent pigments which, as Dr. Fischer has described, was a matter of abiding concern to him both as an artist, and for artistry. He was a fine gentleman - one I am proud to have had the honor of knowing. As ISCC secretary in the early years of AAPL's membership in the Council, I had considerable correspondence with Dr. Conrow and had occasion to visit him and his wife in his home and studio in the old Carnegie Hall building where he lived for many years.

DN

COLOR - ITS MEASUREMENT AND SPECIFICATION

The National Research Council of Canada has just published a report on "Color - Its Measurement and Specification" by Günter Wyszecki. (Report APPOI - 830, May 30, 1958). The report is a summary of five lectures given at the National Research Council in Ottawa from January 22 to 24, 1958.

In the introduction, Dr. Wyszecki points out that color is one of the chief properties that characterizes objects. The apparent close relationship between color and object frequently leads people to believe that color and object are one and the same thing. Women who remove textiles from the store to examine them in daylight know that color depends on illumination as well as on the object. In addition, our eyes and brains need to be taken into account when we are concerned about specifying the color of objects. A typical psychological aspect of color, that is an aspect which involves essentially the brain, occurs when we try to describe colors by means of hue, saturation and lightness.

According to the report, "The purpose of the following lectures is mainly to outline briefly the fundamental ways of color measurement and specification as they are applied in industry and government institutions today. No attempt has been made to give a complete account of all the methods known and also many details have been omitted. Nevertheless, it is hoped that these lectures may serve as an elementary introduction into the field of the measurement of color and its specifications."

In his first lecture, Dr. Wyszecki dealt with "Additive Color Mixtures and Grassmann's Laws." He said that additive mixtures of colors obey simple useful laws formulated by Grassmann in 1853:

1. Any color may be expressed by linear combination of three primary colors.

2. Lights of the same color produce identical effects in mixtures of their spectral composition.

3. If, of a two-or-more component mixture, one or more components are steadily changed (while the other remains constant) the color of the mixture steadily changes.

The mathematical expression of these laws was useful in developing a fundamental system of color specification which is used throughout the world, known as the "C.I.E. System of Specifying Colors." (C.I.E. Commission Internationale de l'Eclairage.) Any color may be specified in the C.I.E. system by means of three numbers, tristimulus values.

Again we know that color depends on the eye and the brain, and we know that individuals' eyes and brains differ. This fact requires the establishment of a standard observer representing average color-matching responses of a large group of observers.

With this basis, Dr. Wyszecki discusses metamerism, color mixture functions, dominant wave length, luminance, and excitation purity. He lists the three C.I.E. standard light sources:

Standard Light Source A	Incandescent	2854°K.
Standard Light Source B	"A" plus filter	4800°K.
Standard Light Source C	"A" plus filter	6500°K.

He then carries the reader through an example to illustrate the method of determining tristimulus values, X, Y. and Z; and chromaticity coordinates, x and y.

The third lecture deals with visual and photoelectric colorimetry. Dr. Wyszecki says that the essential shortcoming of visual colorimetry is that individual differences interfere with the accuracy of the method. These differences, he says are due mainly to the metamerism of the two halves of the visual field of the colorimeter. He also states that the fact that several observers are needed to obtain average tristimulus values which are close to the standard observer would obtain, makes visual colorimetry not very practical in industrial laboratories.

Although instrumental colorimetry helps to reduce this difficulty, spectrophotometry and photoelectric colorimetry have similar drawbacks. Spectrophotometers illuminate samples in different ways. Because of this, different instruments may not read alike, especially when glossy samples are measured.

Most photoelectric colorimeters, because of the rather rough approximation of the C.I.E. color mixture functions, should only be considered as Color Difference meters. These instruments should be used to measure nearly-like colors, and then only those having similar spectral properties.

Little is known about the ability of the eye to reproduce color matches or how well the eye is able to discriminate between colors which are nearly alike. We are in a better position concerning the precision and accuracy of photoelectric colorimetry. Absolute tristimulus values differ up to 10% from one instrument to another. Ratios for tristimulus values on two given instruments stay approximately constant, which means that chromaticity coordinates do not change as much. Deviations in chromaticity coordinates of opaque samples are usually larger than those of filters.

Reproducibility:

Range of Transmittance or reflectance	Reproducibility
0.9 - 0.5	0.5 - 1.0%
0.5 - 0.1	1.0 - 5.0%
0.1 - 0.01	5.0 - 10.0%

Chromaticity coordinates from spectrophotometric data, x, y reproduce to $\pm$ 0.001; from color difference measurements, x, y reproduce to $\pm$ 0.0005.

Systematic errors in measurements may be due to errors in the calibration of the following parts of the instrument:

(1) White standard as calibrated against MgO.

(2) Slit width

(3) Wavelength scale, photometric scale

(4) Viewing and illuminating conditions, especially for glossy samples.

In some instances when extreme care has been given to an individual measurement somewhat better results may be obtained.

Although the C.I.E. system is of fundamental value, it is not very convenient to use in practice. There exists a preference for material standards of color. In some cases one sample of the desired color will be sufficient in color control. In other cases sets of color standards showing a one or two-dimensional variation in color will serve their purpose.

The internal construction of most color systems is done on the basis of one of three plans. Colorant-Mixture systems are based on mixtures of a limited number of dyes or pigments in systematic proportions (Plochere System). Color-Mixture systems are based on additive color mixtures such as the Maxwell disc (Ostwald system materialized in the Color Harmony Manual). There are some combinations such as the screen-plate-printing systems (Hickethier and Villalobos). And finally, Color-Appearance systems are based on the color perception of an observer with normal color vision (Munsell).

Dr. Wyszecki's final lecture deals with Uniform Chromaticity Diagrams. These are variations of the C.I.E. diagram which are modified to produce arrangement in which the color spacing is uniform throughout the diagram. In the ideal uniform color space equal distances in the diagram would represent equal visual differences anywhere in the color space. When this condition is satisfied, equal visually different colors will be represented by a circle in any plane of the color solid. Both Dr. Judd's and Dr. MacAdam's UCS diagrams are discussed. Although considerable research will be required to accomplish this, the current uniform chromaticity diagrams serve the needs of industry.

One of the important applications of colorimetry in industry is the specification of the desired color and the statement of permissible tolerances. Small color differences can be expressed in NBS units. The NBS units represent the number of just perceptable color differences in going from one color to another. Thus, the deviation from a specified color may be represented by an algebraic expression using three terms, L, a, and b. Color information can be transformed from C.I.E. into Hunter's approximately uniform L, a, b space by three simple equations. The Hunter Color Difference Meter has a special attachment for converting L, a, b readings for two test samples immediately into NBS units, and therefore make the instrument very useful for industrial color control.

Dr. Wyszecki again points out that it should be remembered that at present no instrument will always give satisfactory results. There are two reasons for this: commercially available photoelectric colorimeters only roughly approximate the color-matching response functions of the standard observer, and perceptually uniform color space has still to be found.

In industry, tolerances in a purchase order represent an agreement between the supplier and purchaser. Under the most critical conditions the tolerances may not exceed 0.3 - 0.5 NBS units. To control to this tolerance in manufacture, however, may be very expensive. Sometimes large tolerances are possible without reducing the value of the product. When this is the case, demand for small tolerances are unnecessarily expensive.

Sometimes color specifications and tolerances are represented by physical samples. In these cases, the samples should have the same texture and glossiness as the product. The physical samples may be measured and the tolerances established in NBS units. In many cases specifications may be based on color systems, but sometimes because of differences in texture and gloss this is very difficult.

The report contains 17 exceptionally lucid illustrations, and five excellent references:

1. D. B. Judd, Color in Business Science and Industry, New York; John Wiley & Sons, Inc., 1952, pp. 401.

2. Committee on Colorimetry of the Optical Society of America, The Science of Color, New York; Thomas Y. Crowell Company, 1953, pp. 385.

3. R. M. Evans, An Introduction to Color, New York; John Wiley & Sons, Inc., 1948, pp. 340.

4. Y. LeGrand, Light, Colour and Vision, New York; John Wiley & Sons, Inc., 1957, pp. 512.

5. W. D. Wright, The Measurement of Colour, London; Hilger & Watts, Limited, 2nd Ed. 1958, pp. 263.

Ed.

COLOR STANDARDS FOR THE INDUSTRIAL DESIGNER

I was surprised and pleased by Mr. Douglas G. Meldrum's article, "Color Standards," in the May, 1958 issue of Industrial Design magazine. It is a straightforward and comprehensive survey of the complicated problem of color specification, and I feel that not only is it an accurate account but it is also written in such a way that most workers in design and application fields can understand it. There is nothing of the air of mystery and awe which so often permeate articles written for the non-technical reader.

In his introduction, Mr. Meldrum said, "As more and more color is used in and on products, both consumer and manufacturer are becoming increasingly aware of the importance of color consistency and the maintenance of color standards. This places new demands on every industry; and these demands are being met by the development of new color systems, new measuring instruments, and more universally accepted terms for communication."

Mr. Meldrum makes a good case for the need of means of specifying and representing color specifications, and then he proceeds to show what progress spectrophotometry and colorimetry have made in this direction. He gives a comprehensive description of Ostwald, and Munsell color systems.

Finally, he says that, "Color systems in action involve many steps and many experts." As an example, he refers to two color control routines used by Eastman color experts to match their Tenite plastic to a submitted color sample, and the routine used in color control of Chromspun and Estron acetate yarns.

COLOR MATCHING TENITE

If submitted sample is suitable for spectrophotometer analysis:

1. Spectrophotometer curve is run.
2. Tristimulus values X, Y and Z are obtained.
3. These factors are compared with established data of color standards on IBM cards.
4. A match or close lead for color, density and opacity is selected from color file.
5. Color matcher, from experience, adjusts formula.
6. Small trial batch of Tenite is compounded.

COLOR CONTROL OF ACETATE YARNS

This procedure begins with the raw cellulose which is:

1. Evaluated for whiteness, both before and after acetylation, using G.E. recording spectrophotometer, with the Librascope integrator.
2. Further color evaluation is made after dissolving cellulose acetate in acetone, using Beckman DU spectrophotometer.
3. Raw pigments are tested for chromaticity and strength with spectrophotometer and integrator.
4. Pigments again checked after dispersion in thin dope by means of optical density curves.

7. Batch is milled for uniform color dispersion

8. Sample is pressed for comparison.

9. When sample matches, color number is assigned, standard is set up in files according to tristimulus values for future comparison

5. Pigment dispersions added to the dope and mix is adjusted until it falls within specifications.

6. Lubricant, applied to yarn during spinning process, is evaluated for color in terms of dominant wavelength, purity and brightness.

7. After spinning, yarn is again sampled and chromaticity coordinates plotted.

The article points out that the Inter-Society Color Council lists some thirty instruments that are used for color measurement and accepted for establishing and maintaining color standards. They range from brightness testers to spectrophotometers, and from $100 to $13,000 in price.

Photographs of some of the instruments are included in the article along with a description: Bausch and Lomb Color Analyzer, Macbeth Densitometer, Beckman Chromatograph, American Optical liquid colorimeter, and the Lovibond portable Tintometer are among the instruments shown.

The author recalled that Lovibond actually was an English Brewer. He became interested in color as a means for controlling the quality of his beers. Lovibond, of course is now remembered for his contributions to colorimetry, not for his brewing prowess.

"Color standards have become an essential part of today's industry; pink, blue, red, yellow, any color is no longer something that is added after a product has been designed--an afterthought that might give something a little more sales appeal. Color must be part of the most preliminary planning operations. Color problems still exist, and they will probably be a major headache for a long time to come. Industries, within a large company, or among separate companies, have communication difficulties. Many of these barriers have been broken down by the systems and methods of color standardization shown in this article. But, there is still a need for a greater understanding of what is involved in the specification of colors and how these specifications can be upheld. New color standard systems and new equipment for measuring colors scientifically are making this job easier. And the awareness that present methods are not adequate is a healthy dissatisfaction--it promises better solutions in the future."

Ed.

COLOUR IN SURFACE COATINGS - ITS APPRECIATION MEASUREMENT AND CONTROL

Recently your editor received a booklet, "Colour in Surface Coatings," from the Research Association of British Paint, Colour and Varnish Manufacturers, "With the Librarian's Compliments." This is an intriguing booklet, which is available from the Paint Research Station, Waldegrave Road, Teddington, Middlesex; price 7/6.

The following table of contents is taken from the publication:

This treatise, similar to the other two cited in this News Letter[1], introduces the subject of color, its physical aspects, the part played by the eye and the brain, the necessity for specification and representation, the effects of illumination and other viewing conditions, and the behavior of pigments in vehicles.

Under "Colour Charts and Colour Systems," page 33, the publication discusses the kinds of systems as: the pigment mixture, the "Printing Ink" type (Hickethier), the physical type (Ostwald), and the frankly "subjective" type. In this last category not only is Munsell included, but also the new German DIN colour system.

[1] "Color - Its Measurement and Specification," and "Color Standards for the Industrial Designer"

I found the last chapter, "Industrial Applications of Colour Measurement," interesting because it considers some of the practical problems and their solutions. Many of the articles on color leave the reader without acknowledging some of the problems which may lead to serious difficulties. This booklet leaves the reader with the feeling that the techniques discussed in the publication are being applied and that they are serving a useful purpose.

Ed.

CONFERENCE ON STANDARDS FOR TRISTIMULUS INTEGRATORS
WASHINGTON, D. C.
MAY 14, 1958

There is a standardization problem in the field of spectrophotometry which has arisen since the development of the electronic tristimulus integrators. At the present time there is no accepted means in industry for checking these instruments. The existing spectrophotometric standards issued by the National Bureau of Standards are not furnished with colorimetric data and are considered to be inadequate for checking spectrophotometers equipped with tristimulus integrators, because they are not well suited to differentiate between wavelength-scale and photometric-scale errors.

The National Bureau of Standards initiated the development of standard sample glass filters to check the performance of automatic spectrophotometers with tristimulus integrators. Last October NBS held a meeting with representatives of manufacturers of spectrophotometers, glass manufacturers, and users of spectrophotometers with tristimulus integrators in industry. At the meeting which was held at NBS, the persons present expressed their views regarding the problem of glass standards for checking such instruments. It was suggested that consideration be given to a selection of four glasses: selenium orange, carbon yellow, cobalt blue, and didymium glass. Further consideration was given on the operational troubles that had been found with spectrophotometers equipped with tristimulus integrators. Finally it was stressed that what was needed was a check on the end product of the spectrophotometer equipped with the integrator, and that this check have universal application. According to consensus, the number of filters required appeared to be 4 or 5 with tristimulus values X, Y, and Z given for at least source C. Consideration was also given to possible use of the glass standards of the railroad signal glasses for which there is an ample supply and for which a great amount of work has been done at the NBS through the years.

The second meeting regarding this matter was held at NBS on May 14 of this year. At this meeting the discussion started around the selection of glasses and study of the transmittance characteristics of the proposed filters. The objectives were:

1. To select 4 or 5 filters which should be nonlight-scattering, and which will assure the determination of four types of errors:

a. Photometric error
b. Wavelength error
c. Slit width error
d. Stray energy

2. To make extensive spectrophotometric measurements of a set of master standards.

3. To compute certified tristimulus values on each of the standard samples for 0, 4, and 10-mμ slit width.

There were two opposing opinions regarding the selection of glasses to be used for standards based on selections which would (1) give a check on the integrator alone, and (2) provide the standards which will provide a check on the whole system--spectrophotometer and integrator.

The selected glasses will provide a check of the whole system. Extreme care was taken that the selected glasses will be sensitive to the four errors mentioned earlier. The selected glasses are:

1. Selenium Orange
2. Carbon Yellow
3. Cobalt Blue
4. Sextant Green
5. Selective Neutral, 503 C.

At the meeting the usefulness of having a set of reflectance standards was recognized, but the development of such a set was postponed until after the transmission sets of filters are available.

NBS will provide the selected filters, and they will proceed immediately with the preparation of 100 sets of filters which will be calibrated and sold at $250.00 per set. A report will be issued with these filters which will include values of X, Y, Z, x y, and tables of spectral transmittance at 10-mμ intervals from 380 to 790 mμ.

It is felt that the conference was very useful and educative, since all kinds of problems arising with spectrophotometers were disclosed and discussed. The conference was concluded with great satisfaction to all present.

Franc Grum

COLOR TRENDS AND FORECASTING

During recent months many people have written to me suggesting that information on color trends and forecasting would be of great interest to many News Letter readers. Naturally, I become alert when this happens. Frederic H. Rahr, for example said, "Color and its relationship to the Arts and to Marketing becomes increasingly important to a wider and wider number of people engaged in commerce. . . . . each issue would also include a section in which the progress made in the uses of Color in Commerce were reported as effectively as they now are in the sciences."

Everett Call of the National Paint, Varnish and Lacquer Association indicated his interest in the subject in his letter, "I think more information regarding the marketing aspects of color is warranted on the basis of the interest shown in Problem No. 23." This contention is further borne out by three of the items received by the News Letter for publication. (See the items elsewhere in the News Letter.) The NPVLA sent me a copy of their 1958 Color Survey; the AID published a "Color Forecast" in the May issue of their monthly magazine; and the Tanner's Council named their Colors Committee (31 members) and announced the leather colors for spring and summer, 1959.

To cinch the argument, this month's mail brought a color chart from Colorhelm, "100 Colors That Count." These are said to be "COLOR STYLING and COLOR MERCHANDISING based on research studies, industry wide color audits and market tests planned and directed by Joseph P. Gaugler." This advertisement, which contains 100 hand-painted swatches of color, claims that through a survey of color trends (e. g. paint sales) a color audit of the company's "color structure," market studies, and an objective analysis of that entire industry Mr. Gaugler will be able to remove two poor sellers for every new improved color in the merchandise line.

The text points out that one of the serious problems in determining and reporting color trends is designating colors and their corresponding names. Mr. Gaugler reports that his records show as many as 30 different names for a single color. He says that this problem is an interesting study in itself, and that it will be dealt with in a separate report.

Ed.

COLOR IN TELEPHONES During the last annual meeting of the Inter-Society Color Council, Walter Granville suggested that a short article on the historical use of color in telephones might be of interest to the readers of the News Letter.

Color has been employed on handset telephones from the earliest days of their production. In 1928 metallic lacquer finishes were made available. These were old brass, medium gold, dark gold, statuary bronze and oxidized silver. Finishes of this type are costly to produce, require extensive maintenance and do not lend themselves to mass production. Consequently, they were obtainable only on special order, for which the customer was charged a reasonable fee.

In 1930 a small group of artists and decorators was consulted to obtain suggestions for suitable colors. This group, among whom were Virginia Hamill, Harvey Wiley Corbett, Ralph Walker, Lee Simonson, Norman Bel Geddes and John Vassos; selected ivory, gray, green, old rose, Pekin red, dark blue, Yale blue and medium brown. As in the case of the metallic lacquer finishes, these colors were first obtained by the use of suitable paints or lacquers applied to the handset and mounting for the hand telephone set. Yale blue and medium brown were discontinued after a short period of use.

With the development of improved thermoplastic resins, the ivory, gray green, old rose, Pekin red and dark blue were furnished as molded plastic telephones on a more general basis in 1941. It was not feasible to reproduce the metallic colors in thermoplastic material and it was necessary to continue the application of lacquer finishes in order to obtain these appearances. In 1942, it was necessary to stop the manufacture of telephones for civilian use.

It was not until 1949 that the production of thermoplastic sets in colors was resumed. The following table of Munsell Book Notations will help to describe the appearance of these colors: gray green 7.5GY4.2/2, dark blue 2.5B3/4.5, old rose 6.0R5.5/6, Pekin red 7.0R4.0/14, ivory 7.5Y9.3/2. With the resumed production of these colors in plastic, it was found that ivory sets represented 70 per cent of the sales, gray green 12 per cent, with the other three colors making up most of the remainder.

In 1950 a redesigned telephone set, the 500 type set, was in full scale production. This is the set that is most commonly seen today. Mr. Henry Dreyfuss, an industrial designer retained by the Bell Telephone Laboratories for appearance design of apparatus, was consulted on the use of color in this new design of the telephone. Mr. Dreyfuss obtained the services of Howard Ketcham. Mr. Ketcham proposed six colors: ivory, green, beige, red, gray and brown. In 1952 a survey made by the AT&TCo of thirty-seven Operating Companies showed that blue and yellow were also desirable colors for telephones and Mr. Ketcham added these two to his original recommendation.

The Munsell Book Notation of these colors which were eventually adopted are as follows: ivory 2.5Y9.0/2, cherry red 6.0R3.5/12, pastel yellow 5.0Y8.5/9, rose beige 2.5YR6.4/2, medium blue 10B3.8/6, moss green 10GY4.7/2, oxford gray 3.2/(G0.3), mahogany brown 5YR1.8/4. Limited production of these colors in the 500 type set was first undertaken early in 1954. By the end of last year over 7-1/2 million of these colored telephones had been made. The ivory was about 40 per cent of production, rose beige and moss green each 15 per cent.

Several years ago the Laboratories undertook the design of a smaller telephone set. At this time it was considered that a whole new range of colors probably would be desirable since it was expected that this newer type telephone would be used primarily in bedrooms. Surveys made throughout the country in a total of sixty-three cities indicated that a range of pastel colors would be quite desirable. In fact, preference studies indicated that these colors of the pastel variety were appreciated so much by customers that it seemed desirable to include them in the regular 500 type set line of colors. The Munsell Book Notation of these five pastel colors are as follows: white N9.3, light gray N6.8/(G0.3), rose pink 2.5R7.5/7, aqua blue 7.5B7.5/6, light beige 7.0YR7.5/3. These colors were made available in August 1957. At the same time the rose beige, medium blue and oxford gray colors described above were discontinued. At the present time the white, rose pink, and light beige colors are each about 20 per cent of the total production.

Periodic surveys have been and will continue to be made to determine customer's color preferences.

Part of the information contained in this brief report appears in an article by Mr. G. A. Wahl, Telephone Sets in Color, Bell Laboratories Record, July 1956, pages 253 to 254.

W. J. Kiernan
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey

COLORED ADVERTISEMENTS AND TRAFFIC SIGNALS

It may be of general interest to color workers to learn of a recent, and happy, development in applied color matching. In Contra Costa County, California, Ordinance 1009 was passed restricting the color of advertisements. In particular, those advertisements within the vicinity of traffic signals were not to be allowed to conflict with the color of the signals. The colors were specified in Subsection 3 of the ordinance: "Color specifications. Colors are defined herein in terms of the chromaticity coordinates defined on April 11, 1951, by the American Standards Association, Incorporated 70 East 47th Street, New York 17, New York, in their standard designated American Standard Method for Determination of Color Specifications Z58.7.2-1951."

In a recent report before the Highway Research Board in Washington, D. M. Finch (of the Illumination Laboratory, Department of Engineering Field Station, University of California, Richmond, California) described the "Color Comparator for Lights in the Vicinity of Traffic Signals" which he has designed. "The intention . . . was to obtain a comparison of sign colors with traffic signal colors by means of known reference colors provided by the meter." The reference colors were three red limits and three green limits suggested by Deane B. Judd, as follows (private communication from Judd 6-12-58):

Limit Filter	Chromaticity Coordinates CIE Source A		Lovibond Notation		
	x	y	R	Y	B
First red	.615	0.375	13.5	20.0	0.0
Second red	.580	.340	14.0	0.0	0.0
Third red	.540	.300	23.0	0.0	5.5
First green	.400	.440	0.0	5.0	5.0
Second green	.320	.360	0.0	1.5	8.0
Third green	.240	.280	0.0	2.5	14.5

Further Judd stated ". . . that the chromaticity coordinates of colors which are defined as not confusible within traffic signal colors should be as follows:

> y must be greater than x minus 0.240 (to avoid confusion with red traffic signal)
>
> y must be less than x plus 0.040 (to avoid confusion with green traffic signal)."

Finch states (private communication to Warren Rhodes, 4-29-58) that "In operation it was felt that the use of three filters would not be sufficient to precisely determine the chromaticity of the sign colors, hence only approximate judgments could be made. In order to specify the tolerances of matches, more filters would be needed and many observations would have to be taken."

It does seem that this use of the science of color is indeed a noble one. Let us hope for more laws, and more work on the Color Comparator.

Thorne Shipley

"Mr. Thorne Shipley
Research Psychologist
American Optical Company
Southbridge, Massachusetts

Dear Mr. Shipley:

In answer to your questions (a) and (b), a copy of Section XIII, Contra Costa County Ordinance No. 1009 is attached.

(c) - The ruling is not very effective; there are very few signals in Contra Costa County that are affected.

(d) - We are not aware of any similar rulings elsewhere in the country.

Very truly yours,

/s/t/ D. M. Finch, Research Engineer
University of California"

JAPAN COLOR RESEARCH INSTITUTE

Dr. Deane Judd, National Bureau of Standards, receives a publication of the Japan Color Research Institute, "Studies of Color." Although the reports are in Japanese, abstracts of the articles are repeated in English translation. The abstracts are complete and informative. A limited number of requests for Verifax copies of the abstracts will be honored by Dr. Judd.

The following is a list of titles received by the News Letter:

"Problems of Gloss," Genro Kawakami and Toshio Hirai

"Investigation on Color Names (1)," Ichiro Soma and Hitoshi Hashimoto

"Studies on Color Harmony (4)," Takashi Hosono and Kosuke Seino

"Study on Skin Color," Hidemitu Seki, Akira Kodama and Aki Ishii

"Test for the Sensitivity of Detector of Photoelectric Tristimulus Colorimeter," Genro Kawakami and Sadao Yoshida

"Studies on Color Pigments for Cement Products (1)," Syuiti Sugiura, Kazuo Thuruoka, Takao Morii and Tuneharu Yatagai

"Improvement in Standard Skin Colors," Hidemitau Seki, Akira Kodama and Aki Ishii

"Construction of an Achromatic Scale by the Method of Interval Judgement," Torao Obonai, Chizuko Asami, Takayoshi Kaneko, Kinji Mizuno

"Individual Differences in the Color Discrimination - Age and Sex Difference," Hiroshi Motoaki, Masatoshi Tomita

"Individual Differences in the Color Discrimination - Effects of Practice," Hiroshi Motoaki, Masatoshi Tomita

"Experiment on Visual Acuity," Masamitsu Oshima, Hitoshi Hashimoto and Ichiro Soma

"On the Determination of the Lightness Scale of Achromatic Color," Ryuichi Hioki

"The Effects of Surrounding Brightness on Uniform Lightness Scale," Hiroshi Takasaki

"Influence of Saturation upon Lightness Judgement," Sanzo Wada, Takashi Hosono and Ichiro Soma

"Automatic Painting Machine," Genro Kawakami, Hidemitsu Seki and Toshio Hirai

"On the Method of Determining the ULS," Toshio Kimura

"Color Design for an Oil-Refinery," Sanzo Wada, Takashi Hosono and Shuichi Sugiura

"Investigation on Make-Up Technique," Hidemitsu Seki, Akira Kodama, Aki Ishi and ShiGeko Yonemoto

"Errors in the Measurement of Color by a Kind of Comparative Method," Preliminary Report - I.

"The Slide-rule for Calculation of Color Difference," Genro Kawakami

"Method of Quantitative Colorant Mixture, (1) Achromatic Steps," Toshio Hirai