ISCC

News Letter Committee:

Warren L. Rhodes, Chairman
Deane B. Judd
Robert W. Burnham
Helen D. Taylor
Dorothy Nickerson
Ralph E. Pike

Newsletter

NUMBER 141 May, 1959

Send News Letter Items to Editor,
Warren L. Rhodes
Graphic Arts Research Department
Rochester Institute of Technology
Rochester 8, New York

Other correspondence to Secretary,
Ralph M. Evans
Color Technology Division
Eastman Kodak Company
Rochester 4, New York

NEW MEMBERS

The following applications for individual membership were accepted at the last Board of Directors' meeting held on June 10, 11, 1959.

Associate Individual Members	Particular Interests:
Mr. Gerald Barcroft Ewing 933 Ridgefield Road Wilton, Connecticut	Color is synonymous with the word light, so as a designer and consultant, I have based my studies on the visual arts in which color, of course, plays an integral part.
Mrs. Julian Carter Frankel 200 East 66th Street New York 21, New York	My Fashion Consultant Service includes the styling and promotion of color in both the leather and fabric fields.
Miss Ruth M. Johnston Research Center Pittsburgh Plate Glass Company Springdale, Pennsylvania	Automating color control in production and color in decorating.
Mr. Richard L. Lynch Color and Chemicals Division Interchemical Corporation Hawthorne, New Jersey	Color measurement in industry primarily where color controls are involved with pigment dispersions which we sell.
Mr. Robert Safir c/o Electro-Physics Company 287 Broadway New York 7, New York	Psychophysics of light, methods of measurement, analysis and generation of radiant energy, theory of color vision and neurophysiology.

Dr. Thorne Shipley Technical Optics Section Imperial College London S.W. 7, England	Psychological problems of color, vision and acquired color deficiencies.
Mr. E. A. Whiteford 420 Lexington Avenue New York 17, New York	Impulse and influence bonds - a line of researched colored bond papers for direct mail. Impact book paper researched for "restful reading."

Affiliate Individual Members	Particular Interests:
Mr. Eric L. Barry 1374 Sherbrooke Street West Montreal, Quebec Canada	Use of color in decoration, color trends, etc.
Mr. Everett R. Call 2608 North Pocomoke Street Arlington 7, Virginia	Color trends in industry and researching consumer's color choices.
Mr. Shigeo Hattori c/o Industrial Art Institute 313 Shimomaruko-Machi Otaku, Tokyo, Japan	Fashion color of every season in America.
Mr. William L. Matthews The Chemstrand Corporation Decatur, Alabama	Control of natural color and dyeability of non-cellulosic fibers.
Miss Helen Pohlmeyer 10 Stuyvesant Oval New York 9, New York	In the field of textiles.
Mr. Rinehart Skeen Potts Aero Service Corporation 210 East Courtland Street Philadelphia 20, Pennsylvania	Color photography and human color perception.
Mr. Wesley B. Reed Box 78 North Woodstock, Connecticut	The measurement, specification and perception of color as they pertain to transparent materials particularly; and color vision in general.
Mrs. Mary Jeffrey Shannon 137 East 66th Street New York 21, New York	Coordinating color in various fabrics or products; grouping of color for the purpose of promotion or display advantages; painting and other art expressions; combining of colors in rooms or in fashion for both pleasure and trend point of view.

Mr. Howard B. Schiff
5 Blackstone Place
Riverdale 71, New York

Developing a thorough knowledge and understanding of color, its theories and scientific background, for personal use in furthering its applications commercially.

Mrs. Grace Olivia Sprague
5446 Sierra Vista Street
Los Angeles 38, California

Related to correlation of photographic processes (color and black-and-white) with dyes on cloth and with water-color sketches on off-white paper. Pigments, dyes, light, heat and power, particularly the power of suggestion.

MATERIAL STANDARDS FOR COLORIMETRY

Late in 1957 the ISCC accepted Problem No. 22, "Material Standards for Colorimetry of Opaque, Translucent and Transparent Materials". The basis of this problem is the increasing need for stable, rugged material standards, readily available in a wide range of colors, for use in instrumental measurement of the appearance attributes of materials. While some standards are available in limited color ranges as by-products of other uses, there has been little, if any, systematic effort towards what are now the objectives of the Subcommittee for Problem No. 22: To determine the types of materials most suited for use as colorimetric standards; to develop specifications for the preparation of a set (or sets) of representative standards; to arrange for the preparation, calibration, and distribution of the standards; and to develop and recommend procedures for their care and use.

The Subcommittee for Problem No. 22 restricted its consideration initially to the selection of materials for transparent and opaque standards. At the second meeting of the Subcommittee on March 31, 1959, it was concluded that little data have been uncovered on the suitability of materials for color standards. Since the chief property of materials in question is their long term color stability, their evaluation must be made through instrumental measurements of the highest precision and constancy. Typical instrumental reliabilities, which can be maintained over long periods of time, lead to standard deviations of about 0.001 in x and y or 1 MacAdam unit. These reliabilities are referred to the colors of glass transmittance filters or glass reflectance specimens, whose color stability appears to be quite high.

Data are needed on the long term stability of such materials as porcelain enamels and acrylic plastics, which show promise of having high stability.

For some less stable materials, such as cellulose acetate and cellulose nitrate lacquers, data are already available. The experience of Foss et. al. indicates that the cellulose acetate lacquers in the 3rd edition of the Color Harmony Manual are stable within 1 MacAdam unit over 10 years for colors darker than Munsell Value 5, with 2-3 units of yellowing in the lighter colors. Nitrocellulose lacquers probably change about twice as rapidly.

In view of the apparent lack of adequate data on all promising candidate materials, the question was raised whether the Subcommittee should initiate, through volunteers from its membership, a continuing program of measurement

of the color stability of candidate materials. This suggestion met with general approval, and the following program was outlined:

1. Make a preliminary survey of materials and, where pertinent, material-colorant systems showing promise for high color stability.

2. Obtain specimens of such materials in a representative gamut of colors, using commercially available formulations wherever possible.

3. Set up and direct the program of instrumental measurements.

The success of these objectives will require the assistance of volunteers willing to participate in the program. It is our hope that many members of the ISCC, as well as the more limited membership of our Subcommittee, will signify their interest and their willingness to help. Communications may be directed to the chairman, Mr. F. W. Billmeyer, Jr., to the vice-chairman, Mr. C. E. Foss, or to Mr. Henry Hemmendinger, under whose direction the program will be carried out. We require assistance in the following categories:

1. We need additional quantitative data of high precision on the long term color stability of candidate materials, where such data already exist.

2. We need samples for the measurement program to obtain such data as do not now exist.

3. We need assistance in carrying out the required measurements. Demonstrated long term precision and stability of instrumentation is an essential prerequisite.

In addition to its primary investigation of materials, the Subcommittee for Problem No. 22 has given some consideration to the use of material standards for calibrating such color measuring instruments as spectrophotometers and colorimeters. It is generally agreed that the needs of spectrophotometry may be met by sets of standards providing systems checks. It is possible that the set of transmittance standards soon to be made available by the National Bureau of Standards, perhaps supplemented by a few reflectance standards, may supply all the requirements for calibrating a spectrophotometer. (See "Conference on Standards for Tristimulus Integrators", Franc Grum, ISCC News Letter No. 136, July, 1958, p. 14).

The calibration of a colorimeter poses different and more complicated problems. First, by their nature, these instruments have limited absolute accuracy. Thus instead of (or in addition to) systems checks, a colorimeter requires calibration at a number of points throughout color space, whose optimum location and spacing will undoubtedly differ from instrument to instrument. While the Subcommittee has not yet considered this spacing in detail, it is confident that the current work of the Subcommittee for Problem No. 2 will prove most valuable. (See "Problem 2 Committee Reactivated", Kenneth L. Kelly, ISCC News Letter No. 139, January, 1959, p. 2).

A second complication in the calibration of a colorimeter lies in the fact that it may not describe color differences among metameric samples in the same way as do "normal" (not color-blind) human observers. If an instrument is "abnormal" in this sense, then it is impossible to use material standards

with that instrument except by specifying in some way the spectral characteristics of the standards and the samples to be measured. Such a step may require that the Subcommittee consider the problem of metamerism and provide an objective definition of "degree of metamerism".

The Subcommittee is not unaware of the importance of translucent standards and standards for gloss and for other appearance attributes. We hope that, with the continuing assistance and support of the Council, we can expand our activities to these related fields in the near future.

Fred W. Billmeyer, Jr.

NSID NEWEST ISCC MEMBER BODY

The National Society of Interior Designers, Inc., joined the ISCC and was accepted at the last Annual Meeting. In a letter to the News Letter, John W. Taliaferro, Executive Director, said that the NSID is delighted to be a member of the Inter-Society Color Council. Mr. Taliaferro sent the following information about his organization:

"The National Society of Interior Designers is an organization of professional designers who have met the high educational and performance requirements for professional membership, whose work represents the high taste level required for membership, and whose responsibility is to serve the public as professionals obligated to contribute to the public's well being, culture, and satisfaction. NSID designers design interiors, select and coordinate furnishings and supervise the various arts and crafts essential to good design and achieving beautiful interiors and the effects which serve the needs, desires and utility of the client."

The National Society of Interior Designers has four classes of professional membership, a trade membership classification, and also a press membership classification. Like professional membership, Trade and Press memberships are extended to individuals, not to firms. Some 475 Trade representatives throughout the United States and Canada now enjoy NSID Trade Membership.

NSID is designed and organized to give identification and to represent the professional interior designer to the public and society at large of which it is an integral part. The purpose of the NSID is to create and advance the highest taste level for the American home, American business, and a better way of life for Americans. NSID is the certification of the qualified interior designer. The NSID address is 50 East 57th Street, New York 22, N. Y. National officers are Michael Greer, president, Dora Brahms, chairman, national board of directors, executive vice president, Geraldine Nicosia, regional vice presidents, Roger Hargreaves, east coast and Edward F. White, west coast, Edith Gecker, secretary and Helen Carity Green, Treasurer.

The following are some of the exhibitions sponsored by NSID throughout the United States:

TOTAL DESIGN FOR CITY LIVING, an exhibition of Manhattan interiors created by 24 distinguished NSID designers exemplifying the high taste level of the professional interior designer and featuring fine furnishings from the quality trade sources of NSID Trade Members' Firms, at York River House overlooking the river at York Avenue at 63rd Street, New York, N. Y. OPEN TO THE PUBLIC.

Daily, including Sundays: 10:00 A.M. to 6:00 P.M. APRIL TO OCTOBER.

TRADITIONAL DESIGNS ON FIBERGLAS, twelve interior settings designed by 12 distinguished NSID designers featuring traditional designs printed on Fiberglas by NSID Trade Members' Firms to be exhibited at Fiberglas Fabric Center and Pavilion, Owens-Corning Fiberglas Corporation, NSID Trade Members' Firm, 717 Fifth Avenue, New York, N. Y. OPEN TO THE PUBLIC. Daily, Mondays through Saturdays: 9.30 A.M. to 5:00 P.M. MAY TO SEPTEMBER.

NSID SHOWCASE OF FINE FURNITURE DESIGN, a collective offering of ten of America's leading interior designers who have designed the 10 collections of fine furniture. Each designer presents his setting magnificently conceived by the designer in every detail of architecture, fabrics, accessories and furnishings. A trend setting forecast of furniture design in today's living at Grosfeld House, NSID Trade Members' Firm, 215 East 58th Street, New York, N. Y. TO THE TRADE ONLY. 9:30 A.M. to 5:00 P.M. MONDAYS THROUGH FRIDAYS. Permanent exhibit.

NSID CUSTOM RUG DESIGN EXHIBITION, in cooperation with EDWARD FIELDS, NSID Trade Member. Special showing of the 21 original rugs specially designed for Edward Fields' 1959 Custom Rug Design Collection by 21 distinguished Professional Members of NSID. San Francisco, Calif.(Shown May and June.)

SANTA MONICA HOME SHOW, NSID Professional Members of the Southern California Chapter of NSID participated in this presentation of fine home interior design with interior settings designed and executed by distinguished California Members. New Santa Monica Civic Auditorium.

SAN FRANCISCO DECORATORS AND HOMEFURNISHINGS SHOW, sponsored by the Northern California Chapter, National Society of Interior Designers. Forecast of 1960 interior design trends in beautiful settings created by California's foremost interior designers, and presenting quality merchandise of the nation's leading manufacturers of homefurnishings. (June 10th through June 14th, 1959) Civic Auditorium, San Francisco, California.

LOS ANGELES HOME SHOW, NSID Professional Members and NSID Trade Members' Firms participated in this outstanding homefurnishings show. Designed and presented distinguished interiors and exhibits featuring quality merchandise available through designer sources. New Los Angeles Sports Area. (July 16th through July 26th.)

LOS ANGELES BIG TENTH ANNIVERSARY DECORATORS SHOW, sponsored by the Southern California Chapter, National Society of Interior Designers. This show is acclaimed the top quality exhibition of interior and exterior home design and decorative arts presentation representing the taste level of the professional interior designer, and related quality suppliers in the decorative arts and interior design field. OCTOBER 15TH THROUGH 25TH, Pan Pacific Auditorium, Los Angeles, California. OPEN TO THE PUBLIC. Daily and Sundays. 1:00 P.M. to 11:00 P.M.

The National Society of Interior Designers is also sponsoring a trip to Japan in the Spring of 1960. The opportunity to take this tour will be made available to all classifications of NSID members, including student members. The tour is being planned in cooperation with leading Japanese cultural groups, professional societies, civic bodies and leading artists so that members may observe the full scope of the cultural aspects of interests from the resources of its counterparts in the Orient.

THE COLOUR COUNCIL OF CANADA

For the March 10th meeting we had two subjects and two speakers. Mr. Conquergood spoke with both humor and experience on the subject of "Colour Blindness". Having had a great deal of opportunity to make observations, he spoke with authority and was able to make his explanations of normal, protan, deutan, tritan and tetartan understood as well as their significance. As "Colour Blindness" affects the nervous system and the emotions there was a natural step from this subject to Mr. Carswell's topic of "Colour and the Emotions." For this presentation made by request, our speaker dressed as a savant and he gazed (having only a mild type of ferocity) upon his inspired audience. To make a long story short, Prof. Carswell gave an interesting and instructive talk during which he related colours to the emotions and read character and perhaps predicted futures. Nobody questioned the accuracy of the readings, everybody seemed pleased with the speaker's analysis and his promise of better things to come, which certainly gave more assurance to the laughter. A little of Mr. Conquergood's "Colour Blindness" helped to make Mr. Carswell's "Colour Emotions" more plausible.

W. D. Sinclair

PHYSICAL SOCIETY COLOUR GROUP

At the March 18th meeting, Mr. J. W. Perry (Group Chairman) was in the Chair. Over 50 members and visitors were present. Mr. J. Guild (National Physical Laboratory) introduced the Discussion on the Relative Merits of Illuminants B and C with an outline of the history of their origins. He felt that one standard illuminant should be adequate whereas Mr. F. L. Warburton (Wool Industries Research Association), continuing the introduction, while agreeing, felt a case could be made for two. Sunlight plus skylight were fairly constant and illuminant C was useful for "the old boys". The prolonged discussion dealt with the value of illuminants A and E, the advantage of C because the United States used it exclusively, commercial evidence on which countries preferred which type, the instability of liquid filters and the properties of the human eye, the culpability of pyridine, the effect of C on colour discrimination, and the possibility of having a new standard at 5750°K. The debate continues, for no clear cut argument could be crystallised for or against either illuminant.

On April 15th, the Physical Society Colour Group held its nineteenth annual general meeting. Mr. G. J. Chamberlin was elected Chairman, Mr. J. W. Perry became Vice-Chairman and Mr. A. W. S. Tarrant became Secretary. The A. G. M. was followed by an address given by the retiring Chairman, Mr. Perry, on "Psychophysical Measurement". The philosophical principles involved in physical and psychophysical measurements were described, and the similarities between them were discussed in detail. The main questions in measurement were "quid"? and "quantum"? and whereas in physical measurements both are dealt with, in psychophysical work we can only provide an adequate answer to "quid"?. The speaker outlined the various categories of psychophysical measurement and finally considered the delicate question "How much of colour measurement is physical, and how much psychophysical?".

On May 27th arrangements were made for members to visit the Institute of Ophthalmology, and to see some of the work in progress there. The following items were on show:

Demonstrations on chromatic stereoscopy ..... Mr. E. F. Fincham

Measurements of the absorption spectra of visual pigments in suspensions of retinal photoreceptors ... Dr. H. J. A. Dartnall

Large field anomaloscopy ..... Dr. Priscilla Strange

Human cone pigments in foveal regions

Distribution of yellow pigment across the retina ..... Dr. R. A. Weale

The film "Visual Pigments", made at the Institute, was shown.

IDI 9TH ANNUAL DESIGN AWARD PRESENTATION

Three industrial designs were selected by IDI to receive the Annual Design Award. The Palomar Unit-ized Seat for Douglas Aircraft Company, Inc., Cinetronic Electric Eye movie camera for Argus cameras, and the Modular Sculptural Block #5 for Art for Industry (Division of Murals, Inc.) were selected by a seven man committee, headed by Carl J. Bjorncrantz, Sears Roebuck, to receive recognition. The award is based on the fresh approach to design and function, coupled with a practical use of appropriate materials in a product that is mass produced and nationally distributed. The designers honored by the presentation were:

Harvey Bjornlie, Jack Graves, Harold Jencks and Ed Karlquist, Douglas Aircraft Company, Inc.

Ray Grosso, Fred Hertzler and Dominic Saporito, Argus Cameras (Division of Sylvania Electric Products, Inc.

Edwin Hauer, Art for Industry (Division of Murals, Inc.)

The committee were limited to the selection of three awards. Presentation of the awards was made at the Hotel Ambassador, Chicago, June 18th. Banquet speaker at the Presentation was Lawrence B. Perkins (AIA), Perkins and Will. His subject was "Setting for Design". Mr. Perkins, who has himself been honored as a Fellow of the American Institute of Architects, is the author of two excellent books on the phase of architecture for which Perkins and Will enjoys a world-wide reputation, the substantial contribution to the fresh and livable look in schools, colleges, hospitals, commercial buildings and housing.

MUNSELL MOVES

The Munsell Color Company, Inc., are pleased to announce their change of address to 2441 North Calvert Street, Baltimore 18, Maryland. The telephone is CHesapeake 3-2171.

Ed.

AID ELECTS ISCC MEMBER

James Merick Smith, Florida District was elected for a three year term to the Board of Governors of the American Institute of Decorators. Other important officers elected were President, J. H. LeRoy Chambers; Chairman of the Board, Milton Glaser.

Ed.

F. H. RAHR APPOINTED TO ETA MU PI

Frederic H. Rahr was recently selected for membership in the honorary fraternity, Eta Mu Pi, "for the distinguished contribution made to the science of researching consumer demands." The selection was made by the Baruch School of Business and Public Administration, City College of New York

The Eta Mu Pi Fraternity was founded (the Alpha chapter) at New York University about forty years ago. The fraternity was established to honor students of retailing and marketing similar to Phi Beta Kappa of the liberal arts academic field. Each year the more than 20 chapters select two persons from business or science to be awarded the honorary scroll, medallion, key and membership.

Ed.

DR. W.S. STILES, VISITING SCIENTIST AT THE NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA

Last year the National Research Council of Canada, Ottawa, invited Dr. W. S. Stiles of the National Physical Laboratories, Teddington, England, to work with the Division of Applied Physics, as a Visiting Scientist for a period of six months. Dr. Stiles accepted the invitation and arrived in Ottawa last November to work at the Council until the end of May, 1959.

His scientific activities during this period have centered around an experimental investigation on increment threshold summation - a study which explores some of the fundamental questions involved in color matching and chromatic adaptation - and around the problem of establishing a 10° C.I.E. standard observer. It is well known that Dr. Stiles is mainly responsible for a new set of 10° color matching data which are at present being studied by a C.I.E. working committee (Dr. D. B. Judd, chairman). In particular, Dr. Stiles has been cooperating with Dr. Wyszecki of the N.R.C. in specific field trials to test the new 10° color matching data. Extensive experimental and computational work is being carried out which will be submitted to the C.I.E. working committee at the next C.I.E. meeting at Brussels in June.

While visiting the North American continent Dr. Stiles has taken the opportunity to see as much as possible of the United States. Many of the readers may have met Dr. Stiles in person at the last I.S.C.C. meeting and the O.S.A. meeting in New York and at the NRC-Armed Forces Vision Committee meeting in Washington last April. Dr. Stiles, accompanied by Dr. Wyszecki, visited also a number of laboratories in the north eastern United States, in particular, the National Bureau of Standards, the National Institute of Health, the laboratories of Eastman Kodak Company, Bausch and Lomb, Corning Glass Works, Nela Park, Cleveland and Ohio State University, Columbus. At Ohio State University Dr. Stiles gave an invited lecture on the problem of chromatic adaptation. On that occasion he was presented with a special award for his outstanding achievements in the fields of color vision and physiological optics. The citation of this award reads as follows:

THE OHIO STATE UNIVERSITY
Columbus, Ohio

The Institute for Research in Vision presents its first Award for Outstanding Contributions to Research in Vision to

WALTER STANLEY STILES, O.B.E., D.Sc., F.R.S.
Physicist

for a distinguished professional career of basic study of sensory mechanisms of vision in man including co-discovery of the Stiles-Crawford effect and studies of the discriminatory processes constituting the response of man to different wavelengths of the visible spectrum, and for a leading role in assuring the responsible application of basic knowledge concerning human vision to important problems of society.

April 23, 1959

POSITION AVAILABLE

Permanent position available immediately with Ansco. Excellent opportunity for Physicist or Physical Chemist to assume responsibility for spectrophotometry laboratory. Position includes supervision of instrument operation, development of new instrumentation and techniques, and research into applications of spectrophotometric principles. Present instrumental capabilities cover U. V., visible, and I. R. Spectrum. For further information, please contact Mr. Edwin J. Bloom, Jr., Employment Department, ANSCO, Binghamton, New York.

REVIEW OF "GOETHE'S COLOUR EXPERIMENTS"

Mr. M. H. Wilson and R. W. Brocklebank have produced in this paper what for the reviewer is the first fully intelligible discussion of Goethe's experimental results. While obviously biased in favor of Goethe's point of view--which is strange to the way of thinking of most of us--they show by its relationship to modern colorimetric concepts that it is a consistent possible approach to the subject of color mixing. They derive from it Ostwald's "full colors", MacAdam's maximum efficiency pigment limits, and demonstrate the principles of additive and subtractive color mixture. They show also that Goethe was familiar with what we today call color adaptation although being aware (as many writers still are today) only of the relatively slow dark adaptation, he denied this as the cause. Since we know today that both color and brightness adaptation are often essentially instantaneous, we have no difficulty in accepting the results without mystical explanations.

In a rather full discussion of the colored shadow phenomenon they point out that pictures containing all hues can be projected using three "kinds" of blue as the three primaries. The three kinds they describe as "light blue" "medium slightly greenish blue," and "deep primary blue." The result, of course, is to be expected from color adaptation with the eye taking as a white point some position near the center of the color triangle formed by the three colors.

In view of the recent revival of interest in this sort of phenomena many readers would find this article very helpful to their thinking. The phenomena are very striking and although fairly well known have been discussed too little in our current literature, perhaps because of the difficulties inherent in putting them on a quantitative basis.

Ralph M. Evans

STUDIES OF COLOR FROM THE JAPAN COLOR RESEARCH INSTITUTE

Studies of Color, Volume 5, Number 4, 1958, contain three interesting articles and a tribute to the Director of the Japan Color Research Institute, Dr. Sanzo Wada. Dr. Wada was honored with the title "Cultural Contributor" by the Committee of Cultural Medal Winners Selection for significant contributions in the field of color.

Dr. Wada graduated from the Tokyo Academy of Arts in 1904, and in 1909-1916 he was sent abroad for study of fine arts as a government student. After his return to Japan he produced a number of brilliant works. In 1927 he established, at his own expense, the "Association of Standard Color" (precursor of Japan Color Research Institute) for promotion of standardization of color and dissemination of knowledge about color. In 1928 he published standard Color Cards, and in 1931 "Dictionary of Color Names". From 1932 to 1944 he served as Professor at the Tokyo Academy of Arts. He worked with other distinguished color specialists on a Committee of the Ministry of Commerce and Industry to establish standard color specification and to produce color samples for reference. After the war he published "Standard Colors", "Guide to Standard Colors", and "Revised Dictionary of Color Names". In 1955 he received that Academy Prize for his color design in the film "Zigoku-mon" and recently he directed the color-conditioning of the Tokuyama Oil Refinery. He has worked in Japan on the Munsell Renotation Color in cooperation with the Munsell Color Foundation and Company.

The following are abstracts (Published in English) of the articles which appear in "Studies of Color" Vol. 5 No. 4:

Studies on Color Harmony
In the case of Trichromatic Combinations
Takashi Hosono & Yoshiko Shimomura

In place of Color harmony based on two color combinations heretofore discussed in a series of papers, Color harmony in the case of trichromatic combinations are systematically investigated.

Almost the same strategic procedures as in the previous papers are employed, materials used in this survey are 516 sorts of samples of tri-chromatic combinations.

Subjects are sixty-two whose occupations are directly related to color. The results so far obtained are:

1. Achromatic or chromatic combinations. The most frequently preferred samples are achromatic combinations, and the next ones are mixed type of samples. The last ones are samples composed solely of chromatic colors.

2. Hue interval among components. A group of combinations in which three components belong to the same hue are frequently given harmonious judgments. The next preferred group of samples are those in which differences in hue of components keep nearly a geometrical proportion.

3. Value interval among components. Samples whose two components have the same value and only one differs from other two are preferred Samples whose three components have similar values are also preferred. This conclusion is interesting because of its accord with Ostwald theory.

4. Inquiry on the subjects' attitude when they are asked judgment is prepared and the other influential factors are also discussed.

Examination on Accuracy of Measurements of Photoelectric
Color Difference Meter for Cosmetics
Toshiharu Tsunemituu & Genrō Kawakami

The Photoelectric color difference meter is designed and manufactured by Nihon Densyoku Co. in Japan for checking in the production of cosmetics. Writers are given an opportunity to examine the accuracy of its measurement, whose data are presented here.

In this survey, cosmetic materials are selected as checking object; pink and ochre as face powder, red as rouge, gray, brown and green as eye-shadows, as well as skin color as foundation cream.

Comparisons of checking both by a spectrophotometer and a color differencemeter reveal that though this can not be employed as a substitute of spectrophotometer as such, this instrument may be useful only for checking values of color differences.

The dispersion (root square mean values) of continuous measurements at ten times for the same samples is found smaller than 0.5 NBS unit, though it occasionally happens to excess. In the light of the limits shown in ASTM (within 0.2 NBS unit), the accuracy of this instrument may be estimated eligible.

Since certain cosmetics have liquidity, writers examine both when samples are covered by cellophanepapers over their surfaces and when they are in the plastic packages. In these conditions, it is found that dispersion of measurements is small and that diffusion of light reflected from surfaces are comparatively in good condition.

Employing seven instruments of the same type, several parallel checking are performed, but none of significant difference is found.

It will be, therefore, concluded that a color differencemeter such as this will effectively agree well with the requirements of colorimetric estimation in the case of cosmetics checking.

On the Relationship between Color Difference
and Chromaticity Difference
Genrō Kawakami & Kazuo Yagura

Accuracy of colorimetric measurement, in general, is assured to use a value of chromaticity coordinate. On the other hand, a specification of tolerance of colored products have made use of a value of color difference, such as NBS unit.

Authors express graphically its relationship in isolines of NBS units, on chromaticity diagram as shown in Fig. 1-9, which is corresponded to 0.001 of difference of chromaticity coordinate, using Adams' and Judd-Hunter's UCS formulae.

As results, the isolines of about 0.2-1.0NBS units are obtained on the chromaticity diagram of value 5, except certain groups of colors (blue).

If the accuracy of colorimeter is ± 0.002 and the instrument is used for a measuring greenish material, for example
$x=0.2$, $y=0.5$ and $Y=40\%$, we can know from Fig. 1 that its chromaticity coordinate is on the isoline of 0.3 NBS unit, so that the value is multiplied by coefficient $k_A = 1.3$, from Fig. 9 because $Y=40\%$ and then it is doubled because the accuracy is 0.002. Thus, it is possible to make measurement whose reliability is $0.3 \times 1.3 \times 2 = 7.8$ NBS unit.

JAPANESE IMPERIAL FESTIVAL COLORS

The Japan Fashion Color Association published a set of three cards defining the Imperial Festival Colors for Spring, 1959. The card was supplied by Helen Taylor, who was asked while in Japan to participate in the selection of the colors to honor the Crown Prince and Princess. Selections include traditional colors of Japan and modern "eye appeal" colors. "...when the past and the present meet in order that the whole nation could use these colors as appropriate for the joyous event." Seventeen colors were selected - seven saturated colors, five light colors and five dark colors corresponding to hues of the seven basic colors.

The seven basic saturated colors were selected to express nations rejoicing; the lighter colors show the nation's prayer for the happiness and peace of the Crown Prince and Princess; and the deeper colors on the right are selected to display internationally the success and vigorous activity of the nation.

Mrs. Taylor was honored guest at the meeting to unveil the colors for use of all Japanese Industry and Fashion. About 1500 guests were served red wine, and the director of each industry explained how his group would use the colors. It was suggested that only these seventeen colors be used, and that there was sufficient variety for obtaining good designs and for effects such as value contrast and chromatic contrast. In printed matter silver grey and spun gold should be achieved with metallic ink and pearl white should be the white space. All other colors should be the original paint color. For exterior decorations all kinds of materials should be made in these colors.

The card lists the color name, description of the color, and Munsell notation:

Wistaria. (Murasakifuju) 5.0P 5.5/10 color of purple wistaria tinged with red is considered noble color, selected as vivid fashion color.

Silver gray. (Shirogane) 10.0B 7.5/1 vivid gray color like silver.

Geranium (Beni) 2.5R 5/14 bright light color like its flower.

Spun gold (Kinshi) 8.5 YR 7.5/4 bright golden color like soft silk.

Sapphire (Ruri) 5.0PB 5/10 bright green as sapphire is selected its green for fashion color.

Spring yellow. (Kisuisen) 5.0Y 9/10 soft toned yellow that may be seen in a field in Spring.

Lawn green (Moegi) 10.0GY 5/3 color like lawn in a tennis court tinged with yellow.

The seven colors shown above were selected as basic colors and as their varietal colors to which the following five deep tone colors and five vivid colors added.

Happy crocus (Safuran) 5.0P 7/6 color of Saffran flower.

Pearl white (Shinju) 10.0PB 8.5/0.5 bright gloss like pearl.

Cherry pink. (Sakura) 5.0RP 8/8 color of cherry.

Glorious white. (Zoge) 5.0Y 9/1 gloss, light and splendor like ivory color.

Honey blue. (Wakatake) 2.5B 7.5/6 vivid sweet blue, though different from color of young bamboo, vivid green bamboo color, as Japanese color name is reserved.

Garance. (Akane) 10.0RP 3/5 color dyed in madder, deep and gloomy color of red system.

En-tout-cas. (Shu-urumi) 7.5R 6/8 color name is taken from color of En-tout-cas used in tennis court and is selected as counterpart of lawn green, Japanese color name of this called lacquer-vermilion.

National blue. (Ai) 5.0PB 2.5/6 color dyed in our indigo plant which known from ancient times called national blue.

Lime yellow. (Robai) 7.5Y 7.5/8 yellow color of lime tinged with green. Also like "Robai" flower.

Pine leaf. (Matu-midori) 10.0G 4/3 deep green color like leaf of ever-green pine.

Ed.

COLOR IN HUMAN ACTIVITIES

An announcement has been made by Dounod, Paris publisher, of a 2nd edition of a book on color by M. Deribere, who is General Secretary of the Paris Color Information Center. A translation of the title is "Color in Human Activities." The publisher states that the book contains such chapters as the following: color vocabulary and definitions, classification systems, color vision, colorimetry, the physics of color, the visual field and luminance contrast, light-color relations, psychological effects of color, the effects of color on living beings, color in the factory, signals and codes, color in offices, color in classification, color in homes, color in schools, color in restaurants, and color in hospitals. The book is published in French with 320 pages and 99 figures, and may be purchased from Dounod, 92 Rue Bonaparte, Paris 6e, France for 3800 francs ($7.50 American).

Robert W. Burnham

A BONNET AND A PAIR OF MITTS FROM CH'ANG-SHA

This item was sent to the News Letter by Calvin S. Hathaway, who thought that readers would be interested in knowing about the use of Munsell color notation to describe textiles in a museum collection. It is the first

instance known to Mr. Hathaway of the use of Munsell color notations in the description of textiles of such an age. The bonnet and pair of mitts from Ch'ang-Sha are described in "Chronicle of the Museum for the Arts of Decoration of the Cooper Union", Volume 2, number 10, December, 1958.

"Most of the early Chinese silk remains that have been discovered thus far have been fragments which survive from Han dynasty (206 B.C. - 220 A.D.) sites outside of China proper, along trade routes or at military or colonial outposts. It is therefore with particular pride that the Cooper Union Museum regards its unique group of Chinese silk costume accessories - fascinating puzzling, wonderfully woven, and beautiful, even in their present diminished state - which, despite the existence of no comparable objects, may eventually be proved to antedate the Han finds by one and possibly two centuries and which come from a site within the borders of China. These are a bonnet, a pair of mitts, and the larger part of a hemmed silk square of kerchief size, found in a handsomely decorated lacquer toilet-box excavated at Ch'ang-sha, in Hunan province."

Not only were the items intricately woven and patterned, but they were also many colored. The kerchief, which had lain folded for centuries on top of the other items in the box, is made of fine tabby which is light fawn color (10YR 8/3). The bonnet silk is woven with warps of three colors: a dark brown (10R 2.5/8) for the ground, and vermilion (9R 4.6/9) and honey-color (2.5YR 6.25/10) warps for the patterning. A still darker brown bordering on black supplies the ground color of the mitt silk about the fingers, patterning here being executed in the same vermilion and a clearer, almost canary yellow (3Y 6.5/6.5). The basic structure of the mitt design encircling the fingers is woven in vermilion, honey color, reddish-brown (3YR 3.5/2.5) and darker brown (5YR 2.5/3) warps.

"...the silks may be relied upon to arouse admiration for their beauty and subtlety, at once so complicated and so simple. Delicate in their balance of design and their play of color they are almost miraculous examples of the art of silk weaving in one of its earliest surviving manifestations. The Cooper Union Museum is justly proud to be among the seven or eight museums in the world where such treasures as these silks may be seen studied and enjoyed, beautiful in themselves and landmarks in the long continuous story of the creative spirit of mankind."

Ed.

MORE THAN MEETS THE EYE

Reprinted from Canadian Industrial Limited, "Oval" 1950.

It would be pleasing to think that the glory of the sunset and the colours of flowers are there to add to the beauty of the scene, for even the dullest man has a sense of beauty. However, except in some special cases, the colours of nature are either accidental or utilitarian, and have little to do with the production of beauty as such. That man finds these colours beautiful is a dividend he falls heir to, because of the structure of his eyes and mind. The dog, seeing the world in mere tones of grey, enjoys none of this and, in fact, man, the higher apes, some birds and a few insects are the only living beings known to possess a well developed colour sense.

Most of the colours used in the arts and in commerce are chemical colours, produced by the presence of some coloured material, as in printing ink. Such colours are also found in nature, in the green of leaves (chlorophyll), and the reds and yellows of flowers (anthocyanins and xanthophylls); but many of the most lovely natural hues are what are called "structural" colours, brought about by a peculiar interference with the reflection of white light from the surfaces on which it falls. These colours are found in the metallic blues of insects, in the sunset, in the blue of the sky, and in the whites of flowers. They are little used by man, being difficult to reproduce by any other means, although the modern technique of colouring aluminum by the anodic process gives a structural colour.

Many of these structural colours result when white light falls on a finely grooved or ruled surface, where the width of the grooves or pits is about one-half to one wavelength of light. The effect of these rulings is to reflect the colours (which, combined, make white) in various directions. The dominant colour is reflected at right angles to the surface, as in the case of the metallic blue butterfly or beetle, but the other colours are all present. If one looks along the surface of the blue butterfly's wing, it will appear deep crimson. Such colours can be destroyed by filling the grooves with oil, but will reappear when the oil evaporates. They can also be transferred to wax by pressing it against the surface. The grooves are thus cast in the wax, which acquires the structural colour; this disappears if the wax is ironed out with a finger nail.

Other structural colours arise where there are thin, transparent surface layers, as in the case of soap bubbles and oil films. Such colours are particularly bright where the thin layers are backed by a reflecting layer, and are common in the brilliant metallic insects, parrot feathers, and the like. They can be destroyed only by scraping off the thin layers.

The scattering of light by small air bubbles produces the whites of butterflies and flowers. Bruising a flower squashes out the air bubbles, and destroys the opaque colour. A similar structural white is seen in froth and sea foam.

Some of the most brilliant blues are produced when light is scattered by microscopic opaque particles embedded in a transparent matrix. These are the so-called Tyndall blues, named for the physicist who first investigated them. The most common example is the blue of the sky, due to the scattering of light by the tiny molecules of the atmospheric gases. Tyndall blues are rare in animals, but can be seen in the brilliant blue spots on the under side of dragon flies.

You may now ask, "What purpose do the colours of nature serve?" In many cases they are simply by-products. In the green leaf, the green results because the leaf absorbs all the other colours. It uses the absorbed light as a source of energy to make starch and sugar from water and carbon dioxide. These are combined with materials absorbed from the soil by the roots, and the whole growth of the plant is thus effected. Inasmuch as plants and plant-relatives synthesize nearly all the organic compounds needed by higher forms of life, the complete economy of the living world depends upon this colour phenomenon in plants.

The colours of flowers seem to be of some value in attracting insects, so that they may pollinate the flowers, but this theory is rather weakened by the fact that few insects have any well developed colour sense. However, bees can distinguish a limited range of colours.

Many animals use colour displays as a means of attracting the opposite sex, the best example being the glorious tail feathers of the peacock. Cosmetics are said to serve the same purpose, but there has been no serious research on this question, where faith is better than statistics.

Colour is widely used by many animals for protective purposes, in the form of camouflage, "warning" colours and for protective mimicry. Camouflage is largely a matter of pattern, and is well illustrated by the zebra - easy to see in its cage, but very difficult to spot in its natural habitat. Many dull-looking moths, when resting on rough bark, are almost invisible. Such camouflage is very important to animals and insects, for whom the "hot war" of the struggle for existence never ceases.

Warning colours are used by some insects, largely to warn birds that the coloured insects are not good to eat. Many caterpillars are nauseating to the taste, at worst, poisonous; but, even if they are not swallowed, the act of pecking by a bird will injure them. Their warning colour protects them from trial pecks, but it is only partly successful, because each fledgling bird must learn in the hard way, by trial and error. This means the expenditure of a certain number of insects for training purposes.

The use of colour in protective mimicry is a vast topic, and cannot be even partly covered here. As an example, however, let us suppose there is some unpleasant-tasting insect which birds do not like to eat. It would, no doubt, use its colour pattern as a warning in the direct sense. Another insect in the same area, juicy and pleasant to the taste, might then acquire the same or a very similar colour pattern (through a long evolutionary process). It thus comes to be mistaken for its unpleasant neighbour, and so gains some protection. This protective mimicry is common in butterflies. And it is sometimes carried to quite fantastic lengths, as with the tropical grasshopper, which is of a dull neutral colour and very hard to see. On its sides is marked in black a perfect ant-shape, which is all that can be seen by most birds. The grasshopper thus protects itself by mimicking the ant.

The subject of colour in nature is both fascinating and complex. There is not space here to describe the ways in which colour patterns develop in the growing animal, or to study the seasonal changes or the dependence of colour and pattern on temperature, diet and humidity. Indeed, with colour, there is much more in nature than meets the eye.

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