ISCC

News Letter Committee:

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

Newsletter

NUMBER 140 April, 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 MEMBER BODY AND TEN INDIVIDUAL MEMBERS

The National Society of Interior Designers and ten individual members were accepted into ISCC at the board meeting which preceded the Annual Meeting.

Mr. John W. Taliaferro, Executive Director of the National Society of Interior Designers, was notified that his organization is entitled to appoint ten delegates, three of which are designated as voting delegates.

The following individual members were accepted:

Associate Individual Members	Particular Interests:
Mr. Gultekin Celikiz Philadelphia Textile Institute 3243 Schoolhouse Lane Philadelphia 44, Pennsylvania	Spectroscopy and colorimetry.
Dr. Robert Hefner Department of Psychology University of Michigan Ann Arbor, Michigan	Color selling, color preferences and color blindness.
Dr. Oscar W. Richards American Optical Company Research Center Southbridge, Massachusetts	Color vision and the use of color to assist vision through instruments, especially microscopes.

Mr. Joseph L. Rood Bausch and Lomb Optical Co. Rochester 2, New York	Colored glasses, both as to control and as to theory of colorants in glasses.
Mr. Seymour D. Wassyng Joseph E. Seagram and Sons, Inc. 375 Park Avenue New York 22, New York	Development of greater fidelity (color) in printed materials, new uses of color in plastics, metals,etc.

Affiliate Individual Members	Particular Interests:
Mr. David A. Beech British America Paint Co., Ltd. 1720 Burrard Street Vancouver, B. C., Canada	Color and color trends as applied to industry, commercial buildings, houses.
Mr. 'Gene W. Butt 6 Trinity Square Toronto 1, Ontario, Canada	Color blindness, color organizations (various color systems) and ancient color symbolism.
Mr. Yasuo Inamura, Dr. of Science RI-44, 7-chome Kamimeguro Meguroku, Tokyo Japan	Color measurement, color conditioning and fashion color, color and chemical constitution.
Mr. Kikuo Iwasaki 21 Azabu, Kasumi-Cho Minatoku, Tokyo Japan	To know how knowledge regarding color problems are spread in Japan, and to extend color culture generally by connecting color with production and industry. For that purpose, to study the foundation of color and do research on the color sensation of the Japanese.
Mr. David H. Osgood D. H. Osgood Company 4181 Oakman Blvd. Detroit 4, Michigan	Sale of pigments and Macbeth Daylighting.
Professor R. W. Pickford Psychology Department The University Glasgow, W.2, Scotland	Testing of color vision variations, the study of frequencies and types of color vision defects and their inheritance.
Miss Claire M. Vervaert J. C. Penney Company, Inc. 330 West 34th Street New York 1, New York	Color trends in merchandising, communication, development of simplification of existing color systems and coordination.

1959 ANNUAL MEETING Many people feel that there was something a little special about this year's meeting. Actually, there were several things different about this meeting which made it stand out from others. For example, the attendance was two hundred one. Some of the Problems Sub-Committees held open seminars. These sessions were well attended, and the discussions were lively and interesting. Ralph Evans received the second Godlove Award and Deane Judd delivered the banquet lecture. One delightful interlude in the meeting was a description by Helen Taylor of her experiences and reactions to her recent visit to Japan. Her guests, Mr. and Mrs. Yasuo Inamura of Tokyo, Japan, received many admiring glances from those ISCC members who attended the banquet. Add to this the seminar on Physical Color Standards, tie it together with a smooth-running program and the result is a highly successful Annual Meeting.

Godlove Award

Ralph M. Evans was the second recipient of the Godlove Award of the Inter-Society Color Council. The award, a gold diffraction grating, mounted in a plastic prism, produces all the colors of the spectrum. The words, Art, Science and Industry are engraved on the face of the award. In the center, on one side, appear the words "Godlove Award for Contribution to the Knowledge of Color". On the other side, appears the name of the recipient, the date of the award, and Inter-Society Color Council.

The following is the text of the citation honoring the second recipient of the Godlove Award:

"In 1956 the Inter-Society Color Council accepted a fund established by Mrs. I. H. Godlove to provide for a Godlove award in memory of Dr. I. H. Godlove, Editor of our News Letter for sixteen years, and former chairman. The Godlove Award is presented biennially to a person selected for outstanding contribution to the knowledge of color.

The committee for the second Godlove award consists of Waldron Faulkner (Chairman), Walter C. Granville, and Deane B. Judd. We have selected Ralph M. Evans, Eastman Kodak Company.

The second Godlove Award of the Inter-Society Color Council is presented to Ralph M. Evans in acknowledgment of his distinguished researches in color perception and for his application of the results of those researches not only to the production of photographs in color but also to the presentation, amounting to proof, of the results of the researches themselves by means of color transparencies.

Ralph M. Evans attended Phillips Academy in Andover, Massachusetts, and in 1928 was granted the degree of Bachelor of Science by the Massachusetts Institute of Technology. After working for a year as a physicist at the Research Laboratories of the Eastman Kodak Company on lenticular motion-picture color film, he spent several years in New York City with the Fox Film Corporation. In 1935 he returned to Kodak as a supervisor in the Color Process Development Division of the Research Laboratories dealing with processes applicable to large-scale operations, and with the visual

and subjective aspects of color photography. In 1945 he became superintendent of the Color Control Department of the Film Manufacturing Division which in 1953 was renamed the Color Technology Division with Ralph M. Evans as its director, a position which he has held up to the present time.

Ralph M. Evans has developed the equivalent-neutral-density system of measuring the colors of colored photographs, and he designed the measuring instrument to go with this system. The color by this system is specified by the amounts of the primary dyes deposited to produce the color. He has advanced the theory and practice of photographic masking, including highlight masking, brightness masking, and color masking. He has contributed importantly to the theory and practice of scene lighting for photography dealing authoritatively with adjustment of the lighting ratio between background or shadows and the figure itself so as to take account of brightness constancy in visual appraisals of the scene. But we do not propose him for the Godlove Award primarily for these contributions, important though they be.

We propose Ralph M. Evans primarily for his clarification of the factors influencing visual perceptions, for his explanation of effects of viewing conditions on the appearance of color photographs, both transparencies and reflection prints, for his clarification of terminology and concepts relating to color vision and color photography (luminance, brightness, lightness, diffuseness), for his studies of the changes of color perception with adaptive state of the eye including development of theory to explain these changes, and for his analysis of the various visual constancy effects, particularly color constancy and size constancy, and the modes of appearance.

The results of these researches have been described in articles in scientific and technical journals among the 28 listed below, and in two books:

An Introduction to Color, John Wiley & Sons, Inc., New York, N. Y., 1948.
Principles of Color Photography, co-author with W. L. Brewer and W. T. Hanson, Jr., John Wiley & Sons, Inc., New York, N. Y., 1953.

The work of Ralph M. Evans in color has made him a widely recognized authority. He has served on the color committees of the Optical Society of America, Illuminating Engineering Society, Society of Motion Picture and Television Engineers, and the American Society for Testing Materials, as well as being former chairman and presently the highly effective Secretary of our own Inter-Society Color Council. He received the Warner Medal of the Society of Motion Picture and Television Engineers, 1949; an Award by the Photographers' Association of America for "distinguished service to professional photography" in 1955, and the Progress Medal, the highest award of the Society of Motion Picture and Television Engineers, in 1957.

These are high honors, of which anyone would be proud, and which few can hope to attain; but we now honor Ralph M. Evans for an achievement not duplicated by anyone.

He has not only brought to the study of color perception a thorough understanding and appreciation of research results by others in this field, and built upon them to create clarifying concepts of his own, subjecting these concepts to experimental tests, but also he has made a unique contribution. He has made of projection in color a superb tool by which his conceptual

findings are presented, explained, and proved in a way not possible by other means, and not approached by any other contributor to the science of color perception. He has prepared no fewer than 19 lectures (see titles below) based upon color transparencies to present the results of his researches. These lectures have been presented a total of 229 times, including presentations in Canada, England, and Sweden. The value of these lectures as a contribution to the knowledge of color can scarcely be over-emphasized, and this will be readily agreed to by anyone who has had the privilege of seeing one. The viewer not only knows precisely the subject of the study and the conditions of the research, for they are right before him, but can see that the conclusions are correct from immediate visual proof.

Mr. President, we take pleasure in recommending to you our unanimous choice for the second Godlove Award, Ralph M. Evans. We only regret that in trying to recall to you his achievements, we have been unable to show you the proper selection from his own library of color transparencies.

Waldron Faulkner, Chairman
Walter C. Granville
Deane B. Judd
Committee to Select Recipient
for 1959 Godlove Award

PUBLICATIONS BY R. M. EVANS IN SCIENTIFIC AND TECHNICAL JOURNALS

Photographic development and the latent image, (with W. T. Hanson, Jr.) Phot. J. 77, 497 (1937).

Reduction potential and photographic developers: The effect of sulfite in developing solutions, (with W. T. Hanson, Jr.), J. Phys. Chem. 41, 509 (1937)

Reduction potential and the composition of an M.Q. developer, (with W. T. Hanson, Jr.), JSMPE 30, 559 (1938).

Color densitometer for subtractive processes, JSMPE, 31, 194 (1938).

Chemical analysis of an M. Q. developer, (with W. T. Hanson, Jr.), JSMPE, 32, 307 (1939).

An opacimeter used in chemical analysis, (with G. P. Silberstein), JSMPE, 32, 321 (1939).

Maintenance of a developer by continuous replenishment, JSMPE, 31, 273 (1938); Cine-Techn. 4, 169 (1939).

Report on the activities of the Inter-Society Color Council, JSMPE, 37, 292 (1941).

Synthetic aged developers by analysis, (with W. T. Hanson, Jr. and P. K. Glasoe), JSMPE, 38, 188 (1942).

Iodide analysis in an M.Q. developer, (with W. T. Hanson, Jr. and P. K. Glasoe), JSMPE, 38, 180 (1942).

The determination of small amounts of iodide in photographic developers, (with W. T. Hanson, Jr., and P. K. Glasoe), Ind. Eng. Chem. Anal. Ed. 14, 314 (1942).

Copper and sulfide in developers, (with W. T. Hanson, Jr., and P. K. Glasoe), JSMPE, 40, 88 (1943).

Factors affecting the accumulation of iodide in used photographic developers, (with W. T. Hanson, Jr., and P. K. Glasoe), JSMPE, 40, 97 (1943).

Visual processes and color photography, JOSA, 33, 579 (1943).

Brightness constancy in photographic reproductions, (with J. Klute), JOSA, 34, 533 (1944).

The description and specification of color, Paper Trade Journal, 125, No. 2, (July-Dec. 1947).

Light sources and colored objects, Illuminating Engineering, 44, No. 1 (January, 1949).

Seeing light and color (condensation), Bulletin of Amer. Inst. of Architects, p. 31 (July, 1949).

Seeing light and color (condensation), Scientific American, 181, 52 (1949).

On some aspects of white, gray, and black, JOSA, 39, 774 (1949).

Painting with color film, Art News, 49, 44 (1950).

Derivations from colour photographs, Penrose Annual, 45, 81 (1951).

Seeing light and color (condensation), International Lighting Review, No. 2, p. 9 (1951/52).

Influence on color perception of adaptation to illumination, (with R. W. Burnham, and S. M. Newhall), JOSA, 42, 597 (1952).

Creative directions in color photography, Journal of the Photographic Society of America, p. 15 (February, 1954).

Observer adaptation requirements in color photography and color television, (with W. L. Brewer), JSMPE, 63, 5 (1954).

The expressiveness of color, Education Theater Journal, 6, 327 (1954).

Prediction of color appearance with different adaptation illumination, (with R. W. Burnham and S. M. Newhall), JOSA, 47, 35 (1957).

Lectures by R. M. Evans Based on Color Transparencies

The Problem of Amateur Color Photography

The Printing of 16mm Kodachrome Duplicates

Lighting a Subject for Color Photography

Light Sources and Colored Objects

The Description and Specification of Color

Depth Perception in Color Photography

On Some Aspects of White, Gray and Black

Color Photography and Reality

Seeing Light and Color

Some Psychological Factors of Colors in IES Problems

Derivations from Color Photographs

The Expressiveness of Color

Creative Directions in Color Photography

Creative Directions in Color Photography (Condensed Version)

Surfaces as Seen and Photographed

Color and Brightness in Projected Pictures

The Reproduction of Color Photographs

Sharpness and Contrast in Projected Pictures

Sharpness and Contrast in Projected Pictures (Condensed Version)"

* * * * *

Dr. Deane B. Judd, Banquet Lecturer

An outsider might have considered Dr. Judd a rather droll and interesting speaker, but ISCCers were at times moved with admiration, and convulsed with laughter. Many times throughout the presentation, handkerchiefs were used to wipe away tears of laughter from the cheeks of color specialists. Everyone listened intently as Dr. Judd shared with the audience some of his experiences at the National Bureau of Standards. Dr. Judd first discussed some of the guest workers at the National Bureau of Standards with whom he has collaborated; Dr. Günter Wyszecki, Fulbright Scholar from Berlin, presently in charge of research on color vision at the National Research Council, Canada; Dr. Ishak Girgis Hanna Ishak from Cairo, now professor of physics at the University of Cairo; Dr. Lorenzo Plaza, from Madrid, now

Acting Chief, Institute de Optica "Daza de Valdes" in Madrid; Dr. Isay A. Balinkin, now professor of physics, University of Cincinnati.

Then Dr. Judd made a thinly veiled attempt to justify his delivering in person a set of reflectance standards to the attractive Mlle. Genevieve Touvay, Institut d'Optique, Paris.

He described incidents regarding Dr. Plaza's attempts to procure 100 sets of Federal Color Standard No. 595 to serve as a basis for Spanish Color Card for Paint.

The most interesting part of the presentation, however, was Dr. Judd's description of some of the requests received by the Bureau and of his attempts to satisfy these requests. What struck me most is the straightforward and sincere way Dr. Judd handles each inquiry no matter how ridiculous or ill-stated it may seem. The following is a list of those requests:

1. Request by a woman's club in Texas through the clerk of a Texas local board of the Selective Service System for definition of the blue of the flag of the United States, and the blue of the Texas flag.

2. Request by a university for the Color Harmony Manual Specifications of the Colors for Academic Schools of Learning designated by Cable Numbers in the Standard Color Card of America.

3. Request from the Army Chemical Center for a suitable wording by which to specify the acceptable color range for a protective ointment for camouflage purposes that must fall between Munsell N 3/ and N 4/.

4. Request from an embassy regarding metameric textiles and how to reduce spectrophotometric data on such textiles.

5. Request from the Group for Research in the Physiology of Vision, London for sources of supply of metameric pairs.

6. Request from a mahogany association for a recommendation of a collection of color chips suitable for a study of the color variation of the various species of "Philippine Mahogany", also how to take an average of color notations from the Maerz & Paul Dictionary.

7. Request from "Believe It or Not" for details as to how the number of discriminable colors was computed as 10,000,000.

8. Request from the District Attorney of a County in California regarding methods of enforcing an ordinance prohibiting the colors of advertising signs visible as part of the background of traffic signals from having colors confusible with the traffic colors (Lovibond glasses recommended for producing limit colors).

9. Request from a mink rancher for a method of measuring the color of mink fur in vivo (Villalobos Atlas recommended).

10. Request from the corporation counsel of a city for the specification of a textile (including color) which if worn by a performer in a burlesque show will prevent the "illusion of bareness".

Dr. Judd wound up his presentation by reviewing the section on systematic naming of colors from Rabkin's Atlas of Colors, Moscow 1956. He showed how the status of Rabkin's work was close to that established by the Inter-Society Color Council in a report by Dr. I. H. Godlove in 1932. In this respect, he said, there is evidence that the Americans through the Inter-Society Color Council are not behind the Russians, but 24 years ahead.

Annual Meeting Statler-Hilton Hotel, New York City

The 28th annual meeting got under way Wednesday morning, April 1, at nine o'clock with a business session in the grand ballroom. This consisted of reports of officers and committees of the Inter-Society Color Council. The Problems Committee report was somewhat more extensive than usual. Of particular interest was the close relationship between the recently reactivated Problem 2, Color Names Committee, under the chairmanship of Kenneth L. Kelly and Problem 23 Committee, Expression of Historical Color Usage, under the chairmanship of Helen D. Taylor. Mr. Kelly described a method by which the centroids could be used in the expression of historical color usage. Problems Subcommittees 2 and 23 have completed a great deal of work.

The reports of the delegations were dispatched with great speed. This was due to an ingenious and novel invention by President Walter Granville.

Mr. A. J. Benjamin, Supervisor of Color Styling Service, Monsanto Chemical Company, Plastics Division, opened the seminar with his subject "Material Color Standards; Practical Problems and Acceptance." Mr. Benjamin spoke of the efforts of the Monsanto Chemical Company to sample color space with pigmented plastics. He stressed the fact that visual sampling of color space with resultant economies to manufacturing companies, has not received the acceptance that it should.

This is presumably due to the reluctance of designers and of decorators to use color chips shown in a fixed color system. In fact, one might say these people sell their services on the basis of their uniqueness.

He was followed by Harry J. Keegan, supervisory physicist, Photometry and Colorimetry Section, National Bureau of Standards. Mr. Keegan, with a very comprehensive slide collection described "Material Color Standards; The Instrumental Approach". This was indeed a most amazing collection of material color standards.

Henry Hemmendinger of Davidson & Hemmendinger, Easton, Pa. wound up the seminar with a presentation "Material Color Standards; the Visual Approach" by Hugh R. Davidson and Henry Hemmendinger. Following the presentation, there were many questions from the floor which led to lively discussion.

Plaudits for a highly successful meeting should certainly go to the program committee. Mr. W. J. Kiernan, Chairman, Mrs. Elizabeth E. Burris-Meyer, Chairman of the Banquet Committee, Mr. N. R. Pugh, Chairman, Exhibits Committee, Mr. G. W. Ingle and Mr. F. L. Wurzburg, Jr.

Visit to the Interchemical Color Center

A very popular event of the 28th annual meeting was the visit to the Interchemical Color Center. Although the Color Center had arranged to accommodate the maximum possible number of people, there were still many who wanted to make the visit but could not obtain admission tickets.

Dan Smith, who has recently returned to the Interchemical Color Corporation, conducted the tour. He described the unique lighting arrangement of the Color Center. The color temperature of the lighting can be varied from daylight at 7500K down through several steps to 3800K incandescent. The display is used to illustrate the effect of changing the color temperature on the appearance of various objects. One of the most dramatic, of course, are the metameric textiles which change appearance under the various light sources.

Mr. Smith also demonstrated the General Electric Spectophotometer with the automatic integrating attachment. It is quite astonishing to see a curve drawn and tristimulus values computed in so amazingly short a time. Other instruments exhibited were tristimulus photoelectric color difference meters, and brightness and gloss meters used in paper and ink measurements.

Mr. Smith said that all of those who wished to attend, but did not obtain tickets should contact the Color Center at their convenience for a tour at a later date. Moreover, Mr. Smith invited anyone else in the Inter-Society Color Council to make arrangements for a tour through the Center when they are in New York.

Ed.

ISCC COLOR APTITUDE TEST

The November 1958 issue of the Journal of the Oil and Colour Chemists Association of Britain carries two reports of studies made with the ISCC Color Aptitude Test.

Colour-Aptitude Test: An Analysis of Scores by D. L. Tilleard,

and

Some Results Obtained with the I.S.C.C. Colour Aptitude Test by J. M. Adams

Miss Tilleard's study makes an analysis of 304 test scores along lines similar to the standardization of the test reported in JOSA for June 1956. Figures showing graphically the constituent matches of 210 scores follow the same patterns of distribution - by individual chip and by color group - as the same analysis in the JOSA study. We have made a further test of this similarity of distribution by combining the results of each one of the four colors in the two studies and obtaining the average percent of correct matches with their standard deviations. These values correspond very closely in the two studies.

Tilleard's plot of the empirical and normal distribution of total scores gives a mean score of 72.7 for 304 cases against the original mean of 70 for 698 cases. The peak score of 77 is the same in both studies and the empirical distributions are skewed in a very similar manner.

This agreement is very gratifying in view of the fact that there have been several informal reports of small groups which have shown somewhat lower means. One can hardly argue on the strength of only two major group studies that the paint industry has a unique, and, it appears, higher level of color aptitude. It would be interesting to have a similar compilation of results from other industries in which color matching is important.

Miss Tilleard has fractionated her results to obtain information about certain groups, e.g. women, experienced personnel, and color defectives. With respect to the first two groups no clear-cut trends are shown. Such a conclusion is not at variance with our own experience.

The scores from color defectives add something to the limited amount of such information that has been accumulated. Color defective subjects can make color matches. A few of them get fairly good scores, but the performance of the group is well below the normal group. Why these facts should be so has been discussed elsewhere. Suffice it to repeat that the Color Aptitude Test was designed to discriminate individual differences at high levels of color perception. Segregation of color defect is not one of its functions.

The conclusions which the author derives from the study are in full accord with the recommendations of the ISCC test committee.

Mr. Adams reports a similar compilation of data from another group of 200 subjects. On the basis of preliminary trials, he made some minor modification in the administration of the test, which apparently gave him the feeling of better smoothness and speed of operation but made no appreciable changes in the distribution of scores.

Test scores were analyzed in the same ways as were used in the previous studies and show similar patterns of distribution. The ways in which matches are made with plus and minus errors diminishing in number with size, make the several plottings indistinguishable, color for color.

Mr. Adams' 200 scores distribute themselves about a peak at or slightly above 70 with a curve somewhat skewed toward the lower scores. The mean (not given) lies obviously in the high 60s. This second confirmation of a near normal distribution of scores centering near 70 is further reassurance of the general validity of the scores as measures of color discrimination. The high peak of scores lying a little above the mean probably indicates a factor of manipulation, which is curtailed in effect by the intrinsic difficulty of the test.

The slight effect of a time factor on scores is shown by a scatter diagram in these two dimensions. No coefficient of correlation has been calculated and would probably be of no practical significance.

The color components of scores by 11 color-deficient subjects has been tabulated. Conclusions to be drawn from the table are not different from previous statements of the inappropriateness of this test for such subjects.

Questions raised in the discussion point to some internal irregularities in the test sets. They indicate the intrinsic sensitivity of color discrimination relative to physical controls and measurements of test materials. They do not impugn the fundamental validity of the test. Mr. Adams concludes finally "that the test does, in fact, measure the ability of the candidate to see small differences of color and to decide when two colors are an accurate match."

Forrest Dimmick

MEETINGS OF THE COLOR COUNCIL OF CANADA

The publication of the Canadian group, Colour Comments describes many interesting meetings. On January, Günter Wyszecki gave a series of five lectures at the National Research Council in Ottawa. The lectures are bound and available for distribution. The Editor, W. D. Sinclair states that Mr. Wyszecki has a way of stating facts that has special merit. From Dr. Wyszecki's report, the following introduction was taken:

"Many people in various professions--colour printing, colour photography, painting, interior decorating, to name a few, deal with colour extensively and yet there remains a great deal of confusion as to what actually constitutes colour, and how colour can be specified and measured so that industrial colour control may be possible.

In every day speech the word colour has been applied to a variety of things. For example, the word colour is used to describe the property of an object in the same sense that size and shape are used and then again colour is used to describe a certain visual perception. We know today that any attempt to arrive at a satisfactory definition of the term colour requires consideration of all the complexities of vision.

If we look for the chief properties of the objects around us we usually say that shape, size, and colour characterize the appearance of an object sufficiently. In general, we realize that colour is less important than shape and size as far as recognition of the object is concerned but very often we find that colour contributes significantly to the appearance of an object in a way that neither shape nor size can do. The apparent close relationship between colour and object frequently leads people to believe that colour and object are one and the same thing--in other words, that colour belongs to the object. This, however, is not correct. A few every day experiences can prove this rather quickly. Let us imagine that we are sitting in our living room and daylight comes through the windows and shows up the various pieces of furniture, drapes and paintings in their different colours. After sunset switch on our room light and we will all agree that nearly all the colours of the objects we saw in daylight now appear somewhat different under the artificial light. Sometimes these colour shifts are very small and scarcely noticeable, but very often it happens that quite large colour changes are observed. Fashion stores provide similar experiences. Here we can very often see ladies not only looking at a dress under the artificial lighting, but also having a close look at

the garment near a window or even taking the dress outdoors to look at it in daylight. Many more cases could be mentioned in which we observe colour shifts due to a change in the illumination of the objects. Of course, the conclusion of this is that colour does not belong to the object but is a property of the light which reaches our eyes. It is obvious that there must be a light source emitting a radiation of sufficiently high energy in order to have a visual effect. This light which comes directly from the source of radiation--for example, the sun of the lamps in our livingroom illuminates the objects and is reflected from them into our eyes. Due to certain physical properties of the object, the colour of the direct light from the source is changed after its reflection from the object. However, this peculiar light-modifying property of the object which changes the colour of the light must not be identified as the colour of the object itself.

The radiation of the light source may be measured by physical instruments; the light modifying properties of the object may also be measured by physical instruments and in consequence colour is thought to be a physical attribute. This however, is only partly true since we know that our eyes and brains are necessary to see and appreciate colour. If we had not eyes, we should not be able to see and consequently there would be no colour. If we had eyes only and did not possess a brain, there would still be no colour because how could we tell what we were seeing without our brain??? The fact that we must have eyes and a brain in order to have colour signifies that physiological and psychological aspects must be considered in our attempts to explain colour. A typical physiological aspect of colour--that is to say an aspect in which the eye is involved--is the so-called phenomenon of chromatic adaptation.

Colour is a visual sensation; colour is one aspect of light. Colour does not refer to size and shape. To understand the phenomenon of colour, we must know something about the physics of light, about our eye and the responses of our brain. Colour therefore belongs to the fields of physics and physiology as well as psychology."

* * * * *

At the December meeting Mr. Earl Gray discussed lighting in the theatre. The following is an excerpt from that presentation.

"Colour in the theatre often becomes identified as expressive of specific well known characters. Hamlet is always costumed in black, Ophelia in white, a direct contrast to draw attention to Hamlet. Costume colours are psychologically chosen to emphasize the character of the part, for example,

White and pale blue for virginity and simplicity
Red for regalness
Green for boldness
Pale Grey for timidity
Purple for royalty."

* * * * *

At the January meeting Mrs. Margaret Butt addressed the Canadian Colour Council at Toronto on the subject of "Textiles in Color". She gave a broad survey of color as related to textiles, covering the period from approximately 5,000 B.C. to the present time.

PHYSICAL SOCIETY COLOR GROUP

Forty members and visitors were present to hear Mr. M. Clowes, Physics Research Laboratory, Reading University, talk on "Colour and the Stabilised Retinal Image". An introduction of the apparent function of involuntary, saccadic eye movements was followed by the description of his experimental arrangement which enabled him to stabilise the retinal image. He went on to describe remarkable colour fading and fusion effects and their relation to voluntary and involuntary eye movements. A prolonged discussion ensued.

In the second part of the meeting, Mr. I. M. Gibson (Chelsea College of Science and Technology) spoke on Visual Mechanisms in a Cone Monochromat. He said he had applied the two colour threshold technique to the fovea of a cone monochromat and found that it contained three types of mechanism, much as did the normal fovea. After a discussion the meeting was adjourned for tea and closed at 5:35 p.m.

At the 110th Science Meeting, 15 January, Dr. R. A. Weale, Institute of Opthamology, spoke on "Third Thoughts on Cone Monocromatism". The speaker described apparatus with which he had studied foveal cone pigments; his results differed from Rushton's in four material respects. He showed that - photochemically - there was little to choose between normal and cone-monochromatic foveae. Both contained at least two photo-labile substances which behaved similarly when bleached with white or red light. It was to be concluded that the cone-monochromat's defect cannot lie exclusively in the cones. The Chairman, Dr. Strange and Professor Wright took part in the subsequent discussion. The meeting closed after tea at 4:45 p.m.

DAN SMITH HEADS INTERCHEMICAL COLOR CENTER

On March 20th, the Interchemical Corporation announced the appointment of Daniel Smith as a director of the IC Color Center. Dan Smith succeeds F. L. Wurzburg, Jr., who is returning to Interchemical's printing ink division, to take charge of sales for IPI Everyday inks, IPI speed King letterpress and litho inks and other prepackaged inks. He will also work on national accounts with large customers needing assistance in color problems.

Dan Smith has been active in the Inter-Society Color Council for many years. At one time, he served on the board of directors and was chairman of the TAGA delegation to ISCC for many years. He is a member of the Gravure Technical Association, the Optical Society of America, Technical Association for the Graphic Arts.

In a recent action, President Walter Granville appointed Dan Smith Chairman of the Bibliography Committee. As chairman he will head a committee to collect a bibliography which will be published in the News Letter. Eventually, it is hoped that a compilation similar to the Godlove bibliography will be published by this committee.

The Interchemical Color Center is a central headquarters for basic research, consultation and information in the field of color and in the application of scientific color principles throughout the chemical coating industry.

COLOR FOR THE ISCOLORC NEWSLETTER

Did you notice page 1? With this issue of the News Letter is a change in format which incorporates color in the Inter-Society Color Council News Letter. This experimental design was originated by Harry Kalinowski, Gasport, N. Y. Mr. Kalinowski graduated from Barker Central High School in 1955. At present he is studying at the Rochester Institute of Technology, in the school of Art and Design. In 1958 he graduated from RIT with an AAS degree. Currently he is a fourth year student, working toward a Bachelor of Fine Arts degree. After graduation, he hopes to obtain a position in the field of advertising or industrial designing. His hobby is designing high-fidelity equipment, and at present, this is also his senior thesis project.

If you like the design, drop the News Letter a line and voice your opinion.

Ed.

ESTELLE TENNIS

Through Waldron Faulkner, I learned that Estelle Tennis, former Director of the Color Association, wishes to be remembered to all of her friends in the Council. She is serving on a committee to reorganize the art museums of San Francisco. Miss Tennis now lives in Oakland at 245 Lee Street.

Ed.

CLARENCE DEUTSCH PRESIDENT MINNESOTA AID

At a meeting of the Minnesota Chapter of the American Institute of Decorating in Minneapolis on Tuesday, April 14th, ISCC member Clarence Deutsch of St. Paul was elected President. Mr. Deutsch has been active in the decorating profession over a period of a great many years and also has done considerable work in the field of color.

In addition to these activities he is well known throughout the paint industry and in the graphic arts for the advertising and point-of-purchase materials which he designs and produces for Colorizer Associates. We have missed him at recent meetings of the ISCC - and hope he may be able to be with us in Philadelphia next year.

SEARS RECOMMENDS PROCEDURES FOR FACTORY COLOR CONTROL

Norman Pugh, Sears Color Laboratory, sent the News Letter some very interesting information on the methods for color control which Sears recommends for suppliers. Although unique in many respects, Sears problems related to specification tolerances and standards are similar to those of many large buyers. For example, parts from several suppliers, produced at different times are assembled into a single appliance. Therefore adjacent panels or assemblies must match very closely. To keep factories informed about Sears program and to establish two-way communication lines, Sears held the Seminar described in the September-November News Letter (Nos. 137-138, pages 24-5) and provided a "Suggested Procedure for Factory Color Control".

Sears uses four kinds of reference color plaques in their color control system. The Master Standard Color is retained by the Sears Color Laboratory. Primary Reference Standards are supplied to the factories by Sears.

These are to be protected and stored. They are to be used only to prepare and check Secondary Reference Standards. Secondary Reference Standards are non-critical in distribution. They are used for coordination with suppliers and for preparing and checking Visual Reference Standards. Both Secondary and Visual Reference Standards are made from the materials used in production.

Sears maintains spectrophotometric records on Master Standard Colors and on Primary Reference Standards. These are checked to determine drift or color change. According to the report Sears has found that lacquer sets retained in the Color Laboratory have not changed to any appreciable extent.

One of the serious problems has been to decide whether to check production against the Visual Reference Standard visually or instrumentally. Sears finds that visual procedures using proper standards and lighting are most sensitive. It is difficult, however, to determine and express tolerance limits in visual terms. For this reason, instrumental methods and numerical tolerance limits may be preferred.

For checking the Visual Reference Standard against the Primary Reference Standard, Sears recommends the use of two light sources: Macbeth Daylight (or equivalent) and incandescent. The source should be large and diffuse. The light should be perpendicular to the surface of the sample and standard, while the angle of viewing should be 45° to the surface. This should eliminate specular reflection. According to Sears, this viewing geometry should most closely approximate results obtained instrumentally, and high gloss standards may be compared with less glossy production samples.

The report recommends that the hue, saturation, and lightness of samples from batch to batch (day to day) be plotted on a diagram so that color drifts may be detected. Lightness is plotted on a simple linear scale. Hue and saturation are plotted on a circular diagram. The center of the circle represents the specified color. Vertical displacement represents differences in saturation, and horizontal displacement represents difference in hue. (e.g. left-too green: right-too red).

An interesting observation was brought out in the report. Those factories which have good color control performance records also have little difficulty with the finishing process. Success with color control is almost a direct index of overall finishing process performance.

Sears recognizes the problems involved in checking color. Another problem, equally serious is that of obtaining representative samples. Some suppliers provided samples prepared in the laboratory. These, of course, were unsatisfactory. Some supplied small samples coated and baked in the production line. These, too, were not representative because of their size and because they received different treatment. Sears has found that the best samples are obtained by cutting pieces from a production part.

Ed.

RESEARCH BULLETIN OF THE GOVERNMENT PRINTING BUREAU OF JAPAN

Color Problems in Letterpress Printing by Yuhi Motooka is a report published in the Japanese Government Printing Bureau. The following is an abstract from the report:

"The color produced by a letterpress printing ink depends principally on its film thickness and the reflectance of the background, but also on several other factors. The spectral reflectance curves of several inks applied at different thicknesses over various backgrounds have been measured in a spectrophotometer, and an attempt made to discover the relationships governing the effects observed. In the first experiment, an influence of the background was studied with three inks A, B and C laid down at same thickness of about 1 μ by motor driven scraper over several neutral backgrounds prepared from the same paper. Results are shown in Fig. 1-4.

In the second experiment, an influence of the background and the film thickness was studied with ink A which was applied at four different thicknesses by the above mentioned scraper on to the several neutral backgrounds prepared from same paper. Results are shown in Fig. 5-11.

In the last experiment, an influence of the film thickness was studied with two inks D, E of different color and two different papers at a variety of ink film thicknesses under the same printing pressure and speed, on a special printing quality tester. Results are shown in Fig. 12-16, Fig. 16 also includes result of the second experiment.

Then, the application of the Kubelka-Munk equation for film thickness was studied. Results are shown in Fig. 17.

All the results above may be summarized in the following way:

(1) The major changes with the reflectance of the background in the curves occur in the region of the higher spectral reflectance at the film of "infinite thickness", i.e. that thickness of film at which a further increase produces no further visual change in color.

One may safely say that the spectral reflectance of colorant layer shows a proportional change to that of background, in the narrow change of the reflectance of the background that might occur within practical limits corresponding to normal printing condition.

(2) The major change with film thickness in the curves occur in the wavelength at which the curve is remotest from both curves of the background and the film of infinite thickness. In the case of white background, this major change occurs in the inflected region on the reflectance curve.

It may safely be concluded that, in the range of film thickness of about 1-5 μ, the changes of the reflectance with thicknesses can be calculated by the Kubelka-Munk equation."

Ed.

MISCELLANY

Three hundred years ago, a physics student at Cambridge University would have been told that:

"White is that which discharges a copious light equally clear in every direction. Black is that which does not emit light at all or which does it very sparingly. Red is that which emits a light more clear than usual, but interrupted by shady interstices. Blue is that which discharges a rarefied light, as in bodies which consist of white and black particles arranged alternately .... The Blue colour of the sea arises from the whiteness of the salt it contains mixed with the blackness of the pure water in which the salt is dissolved" (Houston, 1923)[1].

Physical Colour Reproduction
by R. W. G. Hunt

* * * * *

Color observation in the Pennsylvania Railroad, Afternoon Congressional train. Day coach lighting .....

Long lines of fluorescent panels in delicate rainbow of tints were very obvious. Three were pale green; three pale pink, two yellow, one pale gray and one was pale purple.

I assume that the original plan was to use one standard light color and that use and deterioration has shifted the color of the tubes. This is surely a hazard in any attempt to use fluorescent light for standard color illumination.

Helen Taylor

* * * * *

New York Times: "Many Color Blind" London.-More than 1,000,000 in Britain are color blind, a specialist estimates on the basis of his findings in 45 years of testing the sight of England's railroad workers.

Helen Taylor

* * * * *

"Honey, take the purple road."

"But the map indicates the green one."

That mythical byplay could take place if plans being studied by U. S. cement manufacturers go through.

They're talking of different colored highways to help drivers through confusing intersections and road forks.

The proposal was outlined to reporters yesterday by Douglas McHenry, president of the American Concrete Institute which opened its convention yesterday.

He conceded the plan would do little for color blind drivers.

* * * * *

Dazzle Dimmer - Without benefit of driving glasses, a green-tinted interior-mounted light is claimed to drastically reduce the glare from approaching headlamps during nighttime driving. Because of the sudden contraction and gradual expansion of the pupils of the eye when suddenly hit by a high beam, vision is normally reduced to a dangerous level. The green glow softens the glare.

Manufactured in West Germany, and marketed by DECORAMA, 240 E. 92 St., Brooklyn, N. Y., the light is controlled by a dash-mounted switch and is mounted out of the way. Price: $17.95 pp.

Helen D. Taylor

* * * * *

Lipsticks - Nature's True Natural One: Here is an unusual item. It is known as Achiote. Its proper name is Bixa orellana and it is native in Ecuador.

It grows to a height of about 8 feet and when mature it bears seeds covered with a very fine powder. This powder is a dye. This product being perfectly harmless and tasteless is used as a coloring medium for soups and other foods making them look appetizing and attractive. Just a dash of this powder brings about a delightful shade of yellow in soups that gives them a tempting appearance as though enriched with sweet butter.

The Incas, especially those belonging to the Colorado tribe, paint their faces, bodies and hair a bright shade of red using these Achiote seeds. The women use the Achiote seed for lipstick, and it is claimed that it is as good or better than the commercially manufactured kinds. You can get practically any shade of red desired by using more or less of the seed.

The Colorado Indians claim that putting the Achiote color on their bodies wards off insects. Perhaps there is something about the seed that does repel them but of this we have no proof.

The shrub that bears the Achiote seed grows very rapidly and matures quickly producing seed the first season.

John H. Tobe

* * * * *

Evening Bulletin: "Spots Mark Difference" The white miniver cape of a British duke has four rows of black ermine spots, compared to three and half for a marquis.

Helen D. Taylor

* * * * *

Mirage Walls - Infinitely gay, rainbow-hued homes are promised by Italo-Argentinian sculptor Mario di Teana, Parisian inventor and demonstrator of startling new mirage walls for modern buildings. Basic design is like a huge Venetian blind on its side - vertical slices of steel set diagonally between floor and ceiling to hold blocks of colored church window glass. As the sun moves around the building, the room is suffused with colored lights of ever-changing strength and intensity. At night the effect is reversed-room lighting filters between the sheets of burnished steel to illuminate the tinted glass and turn the outside wall into a mass of brilliant color. More complex versions resemble multi-deck sandwiches of pierced steel and colored glass or use portholes that reflect colored lights onto walls of engraved or sculpted steel.

Helen Taylor

* * * * *

Houses of colored aluminum, which need no painting or maintenance, are being offered by a big prefab manufacturer (National Homes Corp., Lafayette, Ind.). The houses have colored exteriors and roofs fabricated from "alodized" aluminum, colored with baked enamel paint. The siding panels are applied over a gypsum board backing; the roof is made of aluminum shingles.

* * * * *

Cats Don't Always Cut a Rug - Colors may make some difference in choosing rugs for cats. One of my readers tells me about a cat who would claw green material, but not other colors. Your cat might have different views. Perhaps green looks like grass to some cats.

* * * * *

Taken from Changing Times magazine for March 1959.

Food Colors in Trouble. Some are poisonous in varying degree, and though there is limited control on most of them, some types of dyes are added without government check. Government officials would like to see firmer controls on these color additives and have asked Congress for the needed authority. Prospects for getting the authority are pretty good. The most recent hassle was over the coal tar coloring that Florida growers used to put on oranges before they were shipped. The growers lost that battle, but have succeeded in pushing through a law permitting a less-toxic dye. Oranges will be tinted with it in the future (thus continuing the general practice of artificially coloring oranges for marketing.- Ed.)

* * * * *

Commenting on color television, Mr. Leonard H. Goldenson, president, American Broadcasting - Paramount Theatres, Inc., said demand was slow but was expected to pick up by the fall of 1959 or 1960. There are 250,000 color television sets in use, compared with some 45,000,000 black-and-white sets. Meanwhile, the company is spending between $20,000,000 and $25,000,000 for color facilities.

* * * * *

LIST OF ARTICLES ON COLOR RECEIVED BY NEWS LETTER

"Electro-Optic Cells as Color Filters," H. F. Hicks, Jr., Photo Eng., 2, pp. 61, (1951).

"An Empirical Derivation of the C.I.E. Luminosity Curve from Color Mixture Data," R. E. Wienke, J. Opt. Soc. Amer., 47, pp. 622-625 (July 1957).

"Entwicklungsrichtungen und Anwendungen Moderner Farbmessgeräte," Andreas Brockes, Die Farbe 6 (1957) No. 5/6.

"An Error for Sensitivity of Detector of a Photoelectric Tristimulus Colorimeter and the Luther's Condition," Genro Kawakami and Yuko Kiyonaga, Studies of Color, Japan Color Research Inst. 5, No. 2 pp. 23 (1958).

"The Evaluation of Optical Images," George C. Higgins and Fred H. Perrin, Photo Sci. & Eng., 2, No. 2 pp. 66-76 (August 1958).

"An Experimental Investigation of the Relationship Between Colour Mixture and Luminous Efficiency", H. G. Sperling, Symposium on Visual Problems of Colour, National Physical Laboratory (Eng.) (Sept. 1957) (In Preprint).

"Factors Affecting the Recognition of Small, Low Contrast Photographic Images", R. S. Barrows, Photo Sci. & Eng., 1, pp. 15 (1957).

"The Fall Colortrend Report," Paint, Oil and Chem. Rev. 120, No. 149 (1957).

"Farbmessung mit dem Microskop," Siegfried Rösch, Die Farbe 7 (1958), Nr. 1/3.

"Further Development of an Opponent-Colors Theory," L. M. Hurvich and D. Jameson, Symposium on Vis. Problems of Color, National Physical Laboratory (Eng.) (Sept. 1957) (in Preprints).

"Gloss Measurement - Past, Present and Future," Harry Hammond, Amer. Paint Jour. 41, No. 37, 94, 96, 98, 100 (1957).

"Group of Colors Replacing Monochrome Trend," Louise C. Mann, Am. Paint & Wallpaper Dealer, 50, No. 8, pp. 32-3, 76 (1958).

"The Growth of Color," American Ink Maker 35, No. 5 (1957).

"Guide to Pigments," Anon., Paint Manuf. 28, No. 11, 352 (1958).

"Hiding Power From Only Photometric Measurements," P. B. Mitton, Official Digest of the Fed. of Paint & Varnish Prod. Clubs, (Feb. 1957).

"The Hiding Power of White Pigments," F. Munk, Paint Manufacture 27, No. 6, (1957).

"A High-Speed Velvet Cleaner for Color Negative," John W. Harper, SMPTE, 66: pp. 17-18, (January 1957).

"Improved Technique for Ion-Exchange Recovery of Eastman Color Developers," John H. Priesthoff, SMPTE 66: pp. 64-65, (February 1957).

"Individual Differences in the Color Discrimination - 1 - Age and Sex Differences," Hiroshi Motoaki and Masatoshi Tomita, Studies of Color, Japan Color Research Inst., 4, No. 1 pp. 29 (1957).

"The Influence of Developer Mechanism of the Color and Morphology of Developed Silver," T. H. James and W. Vanselow, Photo Sci. & Eng., 1, pp. 104 (1957).

"Influence of Observer Adaptation on the Acceptance of Color Prints," C. J. Bartleson, Photo Sci. & Eng., 2, No. 1, pp. 32-39 (June 1958).

"Influence of Saturation Upon Lightness Judgement," Takashi Hosono, Ichiro Soma and Yoshiko Shimomura, Studies of Color, Japan Color Research Inst., 5, No. 1, pp. 23 (1958).

"Instrumental Color Reproduction of Paint," Baltimore Paint and Varnish Production Clubs, Nov. 57.

"Instrumental Methods of Color and Color Difference Measurement," R. S. Hunter, Amer. Ceram. Soc. Bul. 36, pp. 249-55 (1957).

"Investigation on Color Names (1)," Ichiro Soma and Hitoshi Hashimoto, Studies of Color, Japan Color Research Inst. 3, No. 1, pp. 15 (1956).

"Isotope Shifts in Hafnium," William L. Barr, J. Opt. Soc. Amer., 48, No. 9, pp. 658-662 (Sept. 1958).

"It's Fun to Spray Multi-Color," Martin B. Beline, Paint & Wallpaper Logic 30, No. 2, 14, 16, 40 (1958).

"Japanese Photographic Objectives for Use with 35mm Cameras," Kogoro Yamada, Photo Sci. & Eng. 2, No. 1, pp. 6-13 (June 1958).

"Kippers, Cocktails, Confectionery and Colour," G. I. Chamberlin, Die Farbe 6 (1957) Nr. 5/6 pp. 133-140.

"Light Sources and Standards in Daylight Range 7300K-7500K with CIE Standards A, B, and C Included for Reference," Cotton Div., Agricultural Marketing Service, U.S. Dept. of Agriculture, Washington, D. C., August 1957, 2 pages.

"Lightness Scale of Chromatic Colors I," Ryuichi Hioki, Tsutomu Tsukada and Hiroshi Takasaki, Studies of Color, Japan Color Research Inst., 5, No. 1, pp. 23 (1958).

"Lubrication of Release Prints with Silicone," Harry Brueggemann, SMPTE 66: 106-107 (March 1957).

"Luminosity Functions for Various Field Sizes and Levels of Retinal Illuminance," R. E. Bedford and G. W. Wyszecki, J. Opt. Soc. Amer., 48, No. 6, pp. 406-411 (June 1958).

"Luminosity Losses in Dichromats," C. H. Graham and Y. Hsia, The Optician, 134, pp. 315-318 (1957).