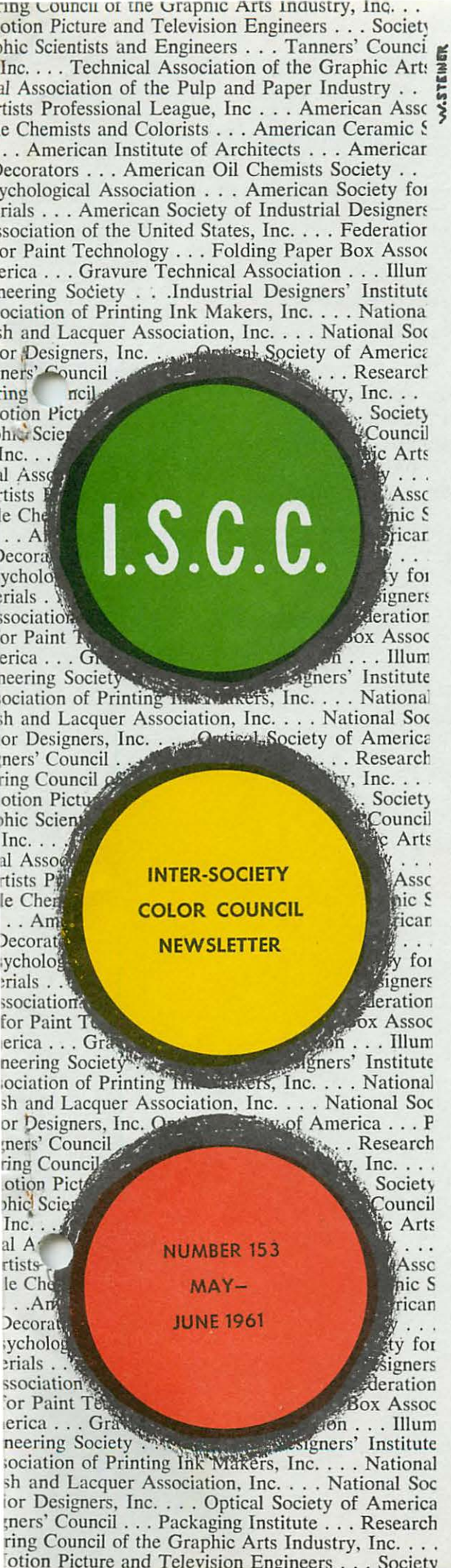
I.S.C.C.
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NEWSLETTER

Send Newsletter 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 in Rochester, New York, on April 9, 1961.

Individual Members	Particular Interests:
Mr. R. C. Ashcom P. O. Box 888 Charlottesville, Virginia	As Assistant to the President of Specialties, Inc., it is my responsibility to market the Chromosorter and other control systems in industry.
Mr. Robert P. Bartlett Allied Research Associates 43 Leon Street Boston 15, Massachusetts	Instrumentation techniques for color measurement, control and sorting equipment.
Mr. John L. D. Bassett P. O. Box 152 Wheeling Tile Company Wheeling, West Virginia	Ceramic tile (floors, walls, interior and exterior).
Mr. Leonard Blackman 456 Beach 127 Street Belle Harbor 94 (L. I.), New York	Teaching, lecturing, and in my commercial work as an industrial designer, now conducting experimental work in the tinting that may be achieved in ceramics. Art Staff, N. Y. City Board of Education, Adult Education Division. Painter and exhibitor, represented in Chrysler Museum; New Haven Museum; Daughters of American Revolution; Seton Hall University; Bronze medal, Ogunquit Exhibit; Watercolor prize, APPL.
Mr. Donald W. Brundage 67 Water Street San Francisco 11, California	Color relationships and color factors involved in materials such as plastics, coatings of all materials, etc.
Mr. John M. Chorlton 155 College Street Toronto 2-B, Ontario, Canada	Specification of paints and colours for school buildings.
Mr. Charles F. Duff 1159 Asher Ct. Walled Lake, Michigan	Related to automotive styling; illumination relating to fluorescence; color photography; public safety; television transmission; education and information.
Miss Gwenyth Alberta Ewens 50 Bay View Terrace Claremont, Western Australia	Colour in Schools, Factories, Hospitals, Domestic Architecture, Commercial Buildings, and Transport. Colour for its Physiological, Psychological and Esthetic benefits. The Influence of Artificial Illumination on Colour. Colour Preferences, and experimental work in regard to the use of colour.

Individual Members	Particular Interests:
Mr. William C. Jeff John L. Armitage & Co. 245 Thomas Street Newark 5, New Jersey	Industrial control of color, tolerances, etc.
Mr. Patrick A. Lenzi P. O. Box 62, R.F.D. #1 Whiteford, Maryland	Illumination, standardization of color language.
Mr. Thomas G. McMahon Naugatuck Chemical Kralastic Color Lab. Naugatuck, Connecticut	Color Matching, color difference, measuring instruments, computers and computing aids.
Mr. Norman L. Miller National Lead Company 56 West 42nd Avenue San Mateo, California	Interior and exterior design for the creation of harmony and beauty.
Mr. Jack H. Millward Wheeling Tile Company Wheeling, West Virginia	Developing new shades and keeping up with color trends.
Dr. Robert C. Newton Research & Development Center Armstrong Cork Company Lancaster, Pennsylvania	From a research standpoint our interest is improvement in control of color on production line in factories.
Mr. Edward G. Pitts McCorquodale Color Card Co. Whiteford, Maryland	Illumination and viewing environment; standardization of color terminology; opaque color standards; color education.
Mr. C. L. Sanders National Research Council Sussex Drive Ottawa 2, Ontario, Canada	Color measurement, color preference, color rendering.
Mr. Yoshio Sugiyama c/o Division of Applied Physics National Research Council Ottawa 2, Ontario, Canada	Measurement, formulation and theory of color-difference.
Mr. Richard E. Young 5 Meadow View Road Wilbraham, Massachusetts	Application of instrumental techniques to color matching and color control. Includes use of digital and analog computers.

DOROTHY NICKERSON RECEIVES GODLOVE AWARD

The Third Godlove Award was presented to Dorothy Nickerson at the Annual Meeting of the Inter-Society Color Council. The citation was read and the Award presented by Deane B. Judd. The following is the text of the citation:

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 Newsletter 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 third Godlove Award consists of Deane B. Judd (Chairman) and Ralph Evans.

The third Godlove Award of the Inter-Society Color Council is presented to Dorothy Nickerson in acknowledgment of her valuable psychophysical studies of color spacing, color tolerances, and color rendition; her developments of instruments and methods for color measurement; her studies of light sources for color measurement and inspection; her applications of the Munsell color system in devising systems of color standards for special purposes (cotton, soils, agricultural products, horticulture), and for the unique talent by which she has been able to organize and direct successful cooperative research on the many problems of color measurement and specification.

Dorothy Nickerson joined the staff of the Munsell Color Company in October 1921 where she assisted A. E. O. Munsell, Milton E. Bond, and F. A. Carlson at the Boston Headquarters of the small company. She moved with them to the New York headquarters and when the Munsell Research Laboratory was established in 1922 she acted as secretary and laboratory assistant for Mr. Munsell. In June 1923 when the laboratory and the company were moved to Baltimore Miss Nickerson moved with them, looking after many of the details of the transfer of laboratory equipment and stock of color standards. Here she collaborated with Blanche Robertson (Bellamy) who joined the company in 1924, and with Genevieve Becker who joined in 1925. At the time of her resignation from the Munsell Color Company in 1926, Miss Nickerson was assistant manager. She took the position of color technologist in the Production and Marketing Administration, U. S. Department of Agriculture, and color technologist in the Department of Agriculture she has been to the present time.

The major responsibility of Dorothy Nickerson in this position was from the start with the Cotton Division, to establish and maintain color standards used in the classing of cotton, and later to set up and carry out by suitable sampling procedures a yearly survey of the color and grade of the entire cotton crop of this country. She developed the Maxwell disk into a practical colorimeter not only for cotton, but also for other agricultural products some of even more pronounced texture than cotton (hay, tomatoes, beets, cranberries, string beans, condensed milk, butter, eggs, apples, potato chips, macaroni, bread, and cake).

So that the results would be readily understood, she expressed them in terms of Munsell hue, value, and chroma, finding it necessary sometimes to give Munsell value the new name, brilliance, because, in the U. S. Department of Agriculture, value is not considered an attribute of color, but is expressed exclusively in dollars. By 1935 Dorothy Nickerson had published nine papers and reports on color measurement of agricultural products in terms of Munsell hue, brilliance, and chroma.

Although the disks used for disk colorimetry of agricultural products were Munsell papers, these were standardized at the National Bureau of Standards by spectrophotometric measurements reduced to tristimulus values by means of the CIE standard observer and coordinate system. In 1935, Dorothy Nickerson published an important paper, still frequently cited, on the weighted-ordinate and selected-ordinate methods of reducing spectrophotometric data, showing the relation in practical terms between the number of ordinates used and the resulting errors of integration.

Her concern for the permanence of the color standards used in cotton classing led Miss Nickerson to devise a method for assessing the perceptibility of color differences. This method is based on differences expressed in terms of Munsell hue, value, and chroma. The original account of it was published by Committee D-13, on Textile Materials, of the American Society for Testing Materials, and this assessment has come to be known as the Nickerson Index of Fading, following her account of it in Textile Research in 1936.

Little need be said of Dorothy Nickerson's notable service to the Inter-Society Color Council as its Secretary from 1938 to 1950. This award is not based on such service; but there are those who say that if it had not been for Dorothy Nickerson in the critical years following 1938, there would have been no Inter-Society Color Council in 1961. It is a fact, however, that the scientific and technological interests and achievements of Dorothy Nickerson expanded notably during these years. Perhaps it is not too much to say that the vitality with which our distinguished former secretary imbued our Council resulted in broadened horizons for herself. At the very least, the ISCC has provided the field within which her superb talent for organizing and directing research on problems requiring cooperative effort could be clearly revealed.

Her first new interest related to the specification of artificial daylight by which color inspections of agriculture products should be carried out, and this interest was certainly related directly to her main responsibility. This interest broadened, however, to specification of artificial daylight for color inspection generally, to textile color-matching in particular, and to studies of color rendition in which Dorothy Nickerson is now a recognized international authority. In these studies she has collaborated very effectively with Norman Macbeth, Charles Jerome, and other members of the Illuminating Engineering Society. When the Illuminating Engineering Society and the Research and Engineering Council of the Graphic Arts found them-

selves at an impasse in their attempts to agree on a specification of artificial daylight for the color appraisal of reflection-type materials in the graphic arts, it was to Dorothy Nickerson that they turned. The specification proposed by her, though an interim one, was accepted with acclaim by all parties concerned. Since then the American Society for Testing Materials has adopted as a recommended practice the specifications developed by her for lighting cotton classing rooms for color grading.

The second new interest lay in color-spacing. She organized a massive appraisal of the spacing of the Munsell colors, a problem proposed to the Inter-Society Color Council but ultimately taken over by the Optical Society of America. In this study she collaborated effectively with Sidney M. Newhall, D. B. Judd, and 39 other collaborators who made observations. The chief result of this study was the development of the Munsell renotations. Incidentally by using these renotations instead of the book notations, the Nickerson index of fading has acquired greatly improved validity. Another result of this study was to lead her into a critical survey of methods of estimating the perceptual size of color differences. Dorothy Nickerson has collaborated in color-spacing and color-tolerance studies with W. C. Granville, I. H. Godlove, C. E. Foss, Keith F. Stultz, and Richard S. Hunter, and has published 7 papers on these subjects.

The third new interest lay in the development and promotion of the ISCC-NBS method of designating colors and its application to the colors of soils and flowers. In this work she collaborated with K. L. Kelly, D. B. Judd, Blanche Bellamy, S. M. Newhall, K. F. Stultz, and a number of soil scientists and horticulturists, producing eight publications on these subjects. With Newhall she computed the centroids of the color ranges for the more than 300 original ISCC-NBS designations expressed in terms of Munsell book notation, and later, when the renotations had been defined, Nickerson and Newhall expressed the theoretical MacAdam limits defining the boundaries of the pigment-color solid in renotation terms. With Bellamy she devised two series of charts showing the colors of soils, and for the American Horticultural Council one set of charts for horticulture, the latter known as the Nickerson Color Fan.

In all these studies of color spacing, color rendition, and color designation, the central basis from which she attacked the problem was the view that the object-color manifold for any given light source is expressible in terms of the color solid; that is, each point in the color solid corresponds to a perceived object-color, and the length of each straight line, regardless of its direction or location in the solid, is proportional to the perceptual size of the difference between the two colors corresponding to the end points. This view is basic to the Munsell color system, and Dorothy Nickerson saw clearly that the problems of color designation, color spacing, color tolerances, and color rendition, are merely special cases of the central problem of determining how to locate object colors properly in color space.

Color designation amounts merely to proper compartmentalization of color space, uniform color tolerances are those corresponding to points on a sphere in color space centered about the standard color, and color rendition is an assessment of the degree to which the color space for the test light source differs from that for the standard source. Dorothy Nickerson personally explored in a very practical way the various psychophysical systems (chiefly the Munsell, but also the Adams chromatic-value space, the Hunter space, the Judd UCS-space, and the Ostwald space) proposed as having more or less significant correlation with the color-perception solid whose dimensions are hue, lightness, and saturation. This exploration has included the influence of change in light source, and has been carried out in collaboration with Kasson S. Gibson, Kenneth L. Kelly, W. C. Granville, C. E. Foss, S. M. Newhall, D. B. Judd, D. H. Wilson, Josephine Tomaszewski, and Thomas F. Boyd. This information of the relationships of various systems and collections of material color standards to the color-perception solid and to each other has been supplied in no less than 13 publications.

Dorothy Nickerson is presently perhaps more thoroughly involved in color work than ever before. She is a member of our own Finance Committee and Newsletter Committee and of our Subcommittee on Color Names, Definition of Color Terms, Color in the Building Industry, and Colorimetry of Fluorescent Materials. She is chairman of the Subcommittee on Color Rendering of the IES Light Sources Committee, and is the American expert on Committee E-1.3.2, Color Rendering, of the International Commission on Illumination. She is a member of the delegation from the Optical Society of America to our Council, and she is a Special Trustee of the Munsell Color Foundation. She is in charge of the color measurements of the cotton crop, and of promoting the use of the Nickerson-Hunter automatic colorimeter for cotton, not only in this country, but also abroad. She is a consultant of the Merriam-Webster Dictionary regarding definitions of color terms. In short, she is the instigator, organizer, director, collaborator in, and doer of, work in color that we have come to love and admire for these many years. She richly deserves to be the third recipient of the Godlove Award for outstanding contribution to the knowledge of color.

Deane B. Judd, Chairman
Ralph Evans

Committee on the 1961
Godlove Award of the
Inter-Society Color Council

From the response it was obvious that those who heard the citation agreed unanimously with Dr. Judd. Dorothy Nickerson's response revealed as the citation pointed out, that, "...the vitality with which ..(she)...imbued our Council resulted in broadened horizons for herself."

She began with "It is my good fortune to have lived and worked in this twentieth century. It provided the opportunity." She explained that color measurement was in its infancy and that color rendition was not yet born.

"As problems came there were no answers, and I had the real privilege of helping to work out the basis of several really practical problems in the field of color measurement and lighting. These were adventures of the mind. The exploration of new fields and the search for knowledge provides a satisfaction that never becomes sated. Of almost everything else in the world we can get too much!"

She named with obvious feeling the "...people I have had the good fortune to work with." She said that Priest gave her the first real glimpse of the scientific attitude, then Dr. Gibson and Dr. Judd.

Of the ISCC she said, "Then the Council was born. I remember the U. S. Pharmacopoeia Color exhibit at the Willard in Washington in 1929 or 30. I recall its early sessions with L. A. Jones, I. H. Godlove, Rea Paul... There were only 6 or 7 Member Bodies in the beginning. Everyone got to know everyone else. All worked in such a spirit of cooperation."

She said of her tour as secretary (1938-1952), "It was a pleasure to serve as secretary. I could not have done it without the very capable help of Josephine Tomaszewski, who is here today and who still works with me in the color laboratory."

She talked of her wartime committees on lighting, color blindness and aptitude. They are all wonderful people. Many of them are here tonight. A few have gone - LeGrand Hardy, I. H. Godlove, Dean Farnsworth.

"The ISCC is a wonderfully fine group. Dr. Godlove in whose name this award is given, exemplifies the cooperation and volunteer service of the experts that made it possible. It is a fitting tribute to him that this award has been established in his name. To receive it is an honor I feel deeply. I am proud to stand with Deane Judd and Ralph Evans as its newest recipient.

"It has been a wonderful time in which to live and work in the color field. There still remains such a lot to be done!"

All who know Dorothy Nickerson are influenced by her vital personality. Her abundant energy and dynamic interest in color is amply testified by the attached bibliography.

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THE COLOUR COUNCIL OF CANADA

A committee of the Council has published a report, "Safety Colours for Hunters." The subject was a topic at the October meeting. Frank Williamson and S. C. Simons described measures currently taken to find optimum colors for hunter safety. Since that time I have received a reprint from ISCC member Oscar W. Richards, "What the Well-Dressed Deer Hunter Will Wear." Oscar W. Richards, Ralph W. Woolner, and Lt. Jack Panjian, from National Safety News. In this article the authors reported that fluorescent orange provides the best protection.

A committee of the Council was formed to assist the Department of Lands and Forests and the Hunting Associations of Canada in choosing between yellow and orange. The committee collected data and published their report in March 1961. Following the recommendations of the National Safety Council, they recommended that the colo(u)r shall have a dominant wave length between 595 mu and 605 mu, a luminance of not less than .50 and an excitation purity of not less than .90. They further recommended that:

(1) Combination of Cap and Vest be approved for hunting wear in Canada. Col(u)r should be the Blaze Orange. The vest of a design to be worn over ordinary clothing, be waterproof, which may be easily put on, or taken off, in not less than three sizes.

(2) Law enforcement officers prepare a suitable tag to be attached to articles of hunter's clothing manufactured or sold in Canada stating that "This article has been approved for colo(u)r standard for safety in hunter's clothing."

(3) Note of change in approved colo(u)r might be noted on hunter's license or application form, so that the new colo(u)r might come into general use more quickly.

NEW I. E. S. GUIDE TO HOME LIGHTING

"Lighting...Keyed to Today's Homes" is the title of a new publication of the Illuminating Engineering Society which provides a practical guide to combining and enhancing fashionable home decor with correct light for living. Written in layman's language, but in every way compatible with I. E. S. lighting and vision recommendations, this new report of the I. E. S. Residence Lighting Committee carries full Society approval.

This attractively covered, full size book contains 88 easy-to-use pages, profusely illustrated with over 250 photographs and drawings, showing the newest in lighting design for residences. Sketches are used throughout to give construction and architectural details, with large, clear photographs to illustrate lighting effects at their best.

"Lighting...Keyed to Today's Homes" gives answers to such questions as: Where do I place portable floor and table lamps? What type and design should I use? How big a bulb? What will my rooms look like with proper lighting? What about fluorescent lighting...over the fireplace or against the living-room ceiling, for instance? And hundreds of other problems encountered by home lighting people every day. Following are chapter titles:

Architectural Lighting
Ceiling & Wall Fixtures
Portable Lamps
Lighted Interiors
Outdoor Living and Gardens
Dimmers for Light Control
Light Sources
Interior Design Characteristics
Lighting for Decorative Accent

Included in the Appendix are: color chip and reflectance chart; wood reflectance chart; glossary of lighting terms; other references.

"Lighting...Keyed to Today's Homes" has been designed specifically to give home lighting and related information to: architects, interior designers, home lighting specialists, landscape designers, teachers, home demonstration agents, electrical contractors and electricians, manufacturers and distributors of home lighting equipment, as well as homemakers interested in proper lighting for their own homes. Single copies are available at $1.50 each; quantity prices on request from: Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, New York.

OSA TO PUBLISH APPLIED OPTICS

In a prospectus, the Optical Society of America proposes a new bimonthly publication, Applied Optics. Editor for the new publication will be John N. Howard. It will contain the following features:

A leader review paper on one of the major aspects of optics or its applications (This review will be about 10,000 words long and will set the main subject of each issue.); contributed technical papers--3,000/5,000 words each--about ten per issue; shop and technical notes; letters to the editor; book reviews.

News columns on:

Government laboratories, industrial laboratories, academic optics, foreign optics, reports of meetings, meetings' calendar, astronomical observatories, personalia.

Each issue will concentrate primarily on one discipline; the first eight issues will probably be: January 1962 -- Optical Pumping; March -- Space Optics; May -- Foreign Optics; July -- Optical Engineering; September -- Infrared; November -- Information Theory; January 1963 -- Astronomy; March -- Instrumentation.

Applied Optics will publish work in the areas of applied optics and closely related scientific and technical fields e.g. physical, electron, ion, ultraviolet and space optics, lens design and optical formulas, plasma, solid state and crystal physics.

For additional information write to Executive Editor, 1155 Sixteenth Street, N. W., Washington 6, D. C.

OPTIKA I SPEKTROSKOPIYA

The Optical Society of America has been translating Optika i Spektroskopiya and distributing it to all OSA members and subscribers to the Journal of the Optical Society of America. This free distribution was an experiment financed by an NSF for three years. In December of this year the NSF grant ends, but the interest in Optics and Spectroscopy is now too lively for OSA to discontinue the translation, so they have evolved the OiS CLUB SCHEME. This is a special subscription rate for members of those societies who wish to take part in the OiS CLUB SCHEME, viz:

To OSA members	$ 7.50
To members of the OiS Club	$11.00
To non-members and libraries	$15.00

If a translation journal is to be of real use (as is the case with any scientific journal) it should be read widely by all the people working in the field, and these research results should be made available in the shortest possible time. Optics and Spectroscopy is published in English translation within three months of the Russian edition. March 1961 issue will be published in English on June 10th.

OSA is making this special offer to members of some sixty scientific societies across the English speaking world, and it asks the members of those Societies to write directly to the Assistant Secretary, OSA, 1155 16th Street, N. W., Washington 6, D. C. for further details or to send in their order.

BIBLIOGRAPHY ON COLOR BLINDNESS

Mrs. Jane Cloak sent the Newsletter a copy of "Bibliography of Color Blindness." The bibliography was prepared for the University of Wisconsin by Mrs. Cloak and Loren C. Becker under the direction of Preston C. Hammer.

In his letter of transmittal Mr. Hammer said that the general objective of the project was to create optimal modes of human communication. "The minimal requirements which I now foresee for this positive response include identification and classification of the color-blind at the earliest feasible age, contributions to the education of the color-blind including readable discussions for parents and teachers, systematic training of the color-blind in the meaning of their defect, and adaptation of educational materials for the color-blind. ...and color identification systems should be made to ultimately improve (traffic) safety and to minimize the percentage of jobs in which color vision is a critical factor."

The following is a complete text of the interesting introduction written by Mrs. Cloak:

Color blindness, of some form, while it is a weakness of some eight to ten percent of the male population, is not usually considered a major problem, either in communication or to the individual who is afflicted. This suggests that it is usually possible to compensate adequately for the defect.

In a few critical situations color blindness may have serious consequences: for instance, where a safety signal must be accurately and quickly identified for color, or where a color match must be made in manufacturing or in gathering scientific information. Because of the occasional hazards and errors due to color blindness, the general approach has been to administer tests for color blindness where it is considered necessary to insure good color discrimination. There are occasional appeals for the mass screening of all high school students, or all personnel in a factory or store. A good deal of effort has gone into the design of safety signals which will be distinguishable to the color-blind, and into the design of tests which will accurately detect and classify the color-blind individual. There remain some problems, however. These may be expected to increase in number and importance as color is used more and more frequently in various areas of communication. It is hoped that the following bibliography will be used in stimulating research with regard to color blindness.

In the area of mass screening for color blindness, for instance, it should be remembered that the word "screen" necessarily involves screening out. This has had the effect of making the color-blind individual understandably anxious to conceal the fact of his defect, especially since it is not clear from what he is being screened, or what the practical implications of such screening might be for him. This may extend to concealing the defect even from himself. The presence of undetected color blindness aggravates the effect on communications. The attempt to conceal or deny his color blindness places an additional burden on the afflicted individual, who is already having to compensate, consciously or unconsciously, in his color experiences: in attempting to use color names, follow discussions involving color, and in avoiding "mistakes" in color matching and so forth.

It has been urged that the term "color-blind" be abandoned in favor of "color weak." While this may be a more accurate description of the condition, it does not seem to deal with the core of the problem, which is that color blindness can be seen as a threat to the individual: an indication of inferiority, perhaps, and certainly likely to prevent him from freely choosing his profession. It means he may constantly be in danger of appearing ridiculous, through some misuse of a color name, or through failure to make a discrimination which is obvious to the normal. The emotional aspects of color blindness are a possible area of study. Such a study should include the formulation of a new approach to testing which would encourage the individual to assess his color vision and make a rational effort to understand the significance, economic, personal, aesthetic, etc., of any defect.

Work has been done on the improvement of signals, to make them more easily distinguishable to the color-blind. There are also some studies on the effect of terrain and surround (color area or patch surrounding area to be identified) on color perception. It should be possible to improve teaching aids which make use of color, and to improve the color-coding of parts, for example, by attention to the color surrounding the patch to be identified. The standardization of surrounds would provide additional clues to the color-blind in making color identifications.

It has been shown that the ability to make color distinctions is extended and refined in older individuals, as compared to younger individuals, and is also related to the general level of intelligence and degree of experience with color. This does not mean that there is an improvement in the physiological ability to see color, but that the identifying and discerning of various colors is partly dependent on concept formation. It is a common defense of the color-blind to "turn away" from colors; that is, to avoid discussions involving colors, and to cling to the belief that their inability to follow such discussions is due to the fact that they are "not interested in colors" or that they "never bothered to learn the color names." This reaction must increase the effect of the physiological defect, since such an individual fails to develop what ability he has to make color distinctions. It has been suggested that it might be desirable to make him more sensitive to small differences in those colors he can see by encouraging him in the use of color names. This would have the further advantage of acquainting him with a range of color names, their relationships to each other and to familiar objects and terrains.

The color-blind individual may become aware of his defect through the presence in his language of a system of color names. He must employ some means of compensation in order to learn the conventions surrounding colors and color names. He can learn the correct connotational patterns associated with various colors: red for violence and danger, green for envy, or for rebirth, etc., but he must do it by analogy and by rote.

There must remain an element of dissonance and confusion. The fact that the defense mechanisms of the color-blind involve color symbols may be significant, e.g. the belief that one has failed to learn the names of colors, or the opposite defense, which is to affect a great deal of precision in the use of color names, in order to mask the underlying uncertainty. Here is an instance in which necessary symbolic behavior must be acquired in an abnormal way. Besides the possible effects on the individual, can we learn anything from his experiences about the sumbolic process in general?

One avenue of approach to answering this question has been to examine the analogies which are drawn between various color sensations and other sensations such as pitch, temperature, or perception of form, for differences between color-blind and normal persons. This may be done using a color sample, or by giving the color name, for purposes of eliciting and comparing the analogous sensations. In an extreme form such analogous sensations are experienced as synaesthesia. Colors have been shown to carry distinctive connotational and effective meanings: literally, shades of meaning! Colors may be ranked between extremes of warmth and coolness, clarity and obscurity, friendliness and distance, for instance. These analogies between the symbols for various types of sensations show evidences of consistency between individuals and even between cultures. How does color blindness affect analogy in sensations? Alternatively, how might the color-blind individual make use of such analogies to understand the nature and extent of his defect? This might also provide some possibilities of avoiding color-form, color-sound or color connotational incongruities, in order to improve the use of color in normal communication, and to provide the color-blind person with additional clues by which to make his color judgments.

Also in the general area of color symbolism is the difference in the system of color names employed by various cultures. It was thought by early anthropologists that "primitive" peoples were physiologically less developed in color perception. More recent investigations have shown that this is not at all the case. What confused the early writers was the lack of correspondence of their color terminology with that of the peoples they visited. From the point of view of international communications, it might be well to investigate the differences in the various systems of color names in use, together with the connotations of various colors and color names. Again, some light might be shed on the general characteristics of symbolic behaviour in comparing and contrasting the differences in color naming.

One interesting possibility in this connection is the effect of cultural differences on the pseudo-isochromatic tests for color blindness. These tests are based on the differences between a normal and color-blind observer in organizing perceptually, certain patterns made up of colored dots on a ground of colored dots. The normal observer will see some color differences not apparent to the deficient observer, the latter will perhaps tend to organize the dots according to a light-dark classification, since the color distinctions are difficult or impossible for him. Or he may group the colors differently, seeing all the colors which contain an admixture of blue as making up a pattern, where the normal would distinguish blueish red and blueish green in "seeing" the pattern on the field of dots. The question is, what effect might a different system of color names have in changing the perceptual organization of the plates? Does a naming system which encourages light-dark distinctions encourage light versus dark organization of the field as opposed to, for instance, yellow-green versus yellow-orange organization? If so, would it alter the response to some of the plates, without the presence or absence of color defect playing any role? How deeply into our perceptions do our linguistic schema penetrate? It has been shown that within European culture there is good agreement on the boundaries, in the spectrum, of the color names. When the plates designed and validated on Japanese or European color vision are used on other peoples, to determine the incidence of color vision defect, are the results valid or distorted? The effect of cultural differences need not be very large to effect incidence data. Consideration should be given to the effects of differences in the quality of "natural" illumination at various latitudes and differences in illumination due to unusual reflectance from water, clouds, foliage and earth.

Returning to the problems of the color-blind individual, it is hoped that this bibliography may stimulate a direct attack on the communication of color concepts to the color-blind. This must start with a detailed understanding of the nature of each of the several categories of color blindness, so that as much as possible may be made of the existing color vision. The use of C. E. Osgood's semantic differential might be one possibility in communicating to the color-blind individual the nature of the color sensations he lacks. Likewise, use should be made of synaesthetic ability, if any, and conscious analogies between color and other sensations should be drawn. There should be practice in the use of brightness and texture, and the fine discrimination of shades in an attempt to relate the perceptions of the color-blind individual to the color names in use around him.

None of these suggestions, it should be emphasized, will make a change in the physiological ability of the individual to distinguish the color of signal lights or to pass any of the tests for color blindness. However, improvement could probably be made in the day-to-day appreciation by the color-blind of the color concepts of others. By the use of secondary clues, and rational compensation for his defect, the color defective might make a better approximation to the normal use of color names and identification of objects by color. This would be preferable to the unhappy attempts to compensate by withdrawal and concealment, the motivation for which is currently being increased by the increased use of tests and improvements in testing.

Jane Cloak
December 1960

The bibliography is divided into sections: General; Tests and Their Description; Testing and Evaluation; Incidence; Genetics; Age and Color Perception -- The Effect of Learning, Maturation, and Degeneration; Effects of Disability in Color Vision in Day-to-Day Life -- Adaptation, Personnel Selection, etc.; Studies Relative to Possible Improvement in Signals and Color Symbols; Cures; Addenda.

The bibliography is 58 typewritten pages. In her letter Mrs. Cloak wrote, "We are continuing in the project and are hoping to test a large group of University of Wisconsin freshmen this summer."

ARTIST-SCIENTIST COMMUNICATION

The Newsletter has carried a series concerning artists' colorant systems. The following is a contribution by Don Francis Hill, Torrance, California, on the subject.

Seeing the reference in the September-December 1960 issue of the ISCC Newsletter by Henderson Wolfe about the January 1960 issue and the statement by Dr. Judd of the "communications barrier between artists and scientists" has prompted me to say something about the subject.

Being an artist with scientific interests, I find that I am somewhere midway between the two, and I find I am able to understand both; however, I will have to admit that both speak a different language and it is no wonder there is a communications barrier.

In order for the scientist to understand the artist, the scientist who is accustomed to speaking in extremely specific terms which mean one thing and one thing only has a very difficult time if he has also confined himself to associating only with a select group of other scientists and not mixing with people who do not speak his language. One can, by intellectual prejudice, effectively remove himself from the world at large and fail to learn how to communicate with those who do not speak on a technical level.

It is natural for people to seek their own kind. It is natural for the intelligent person to lose interest in speaking with people who are not on his level; but it must be remembered that many of these are not unintelligent simply because they have not developed mental agility. They are not necessarily on a

lower level than one's own. Artists, for example, have developed a different agility. The mind is not the only thing one can develop. There is also the body, and the soul. One's bodily reflexes and muscles can be developed till a high degree of coordination is possible. With a good mind, this can result in great dexterity. One does not admire particularly, a person who has developed his body but has ignored his mind. Neither should one feel satisfied to develop only his mind. Furthermore, if one feels inclined to look down on anyone, it is highly probable that the development of the soul is more important than body and mind, so that the mental giant is down the scale from the person with a highly developed spiritual response. The soul feeds on the emotions..... the positive sort, that is, and in a person whose soul has been developed, one finds intuitional faculties that are miraculous. Such a person experiences learning by an inner guidance, so that truth is recognized even if one has never known a particular truth before. The artist often possesses a great degree of this emotional experience, drawing upon visionary sources beyond his own comprehension as well as others. If he has not developed his mental resources, he finds he knows things, but cannot express them adequately. Consequently, he may quibble with the scientist and be at a disadvantage unless the scientist is cognizant of intuitional knowledge and respects it.

In artistic circles, artists are inclined to express what they feel to be true from their emotional response. Their language is extremely flexible, and words are used very indiscriminately. Using color terms very loosely, the artist completely confuses the scientist whose attention is stopped at each word looking for subtle shades of meaning where none is intended. Thus, the scientist can become completely sidetracked and miss the point which the artist is trying to make. In his analysis of individual words, he is like the person who cannot see the forest for the trees.

In order for the scientist to understand the artist, it will help if he tries to analyze what the artist says as if the artist were a foreigner who is not familiar with the English language and who is likely to make a great number of mistakes in choosing his words. Although this is not necessarily true, one knows that he is much more patient with a foreigner and willing to excuse awkward choice of words, and the same attitude will go far in putting attention on the overall thought intended rather than in individual words.

To make himself understood, the scientist should reverse the process, trying to present his papers in as simple language as possible, so that even a small child could understand it.

Unlike other sciences, the science of color occupies an odd position in the world. Whereas one does not expect to understand the terminology of electronics, for example, because these terms are not used in everyday speech, the terms of color are in everyday use by everyone. In other sciences, they can speak in as abstract terms as they want, because it is expected that one will have to study the whole science and will learn the terminology at that time. With color science, there is a challenge not to do as other sciences are free to do. The language belongs to the public and it should not be complicated without reason.

There is a great desire for an authority on any subject to want recognition as an authority. When his subject is too well understood by the general public, he appears to know very little more than they do. Thus, is born the desire to use high-sounding words and make it a little more difficult for just anyone to comprehend him.

Then, too, one wants to command the attention of his fellow-scientists. To make them sit up and take notice, one must be extremely careful not to sound too bourgeois. In fact, in circles where knowledge becomes the measuring stick, one may have the distinctly uncomfortable feeling that one will not be given credit for knowing anything unless he has a better command of technical language than the next scientist. Thus, there is a great competition to use the most advanced vocabulary possible. It must be horrible to be the most highly respected person in one's field and feel that one's reputation is being eyed by a bunch of vultures just waiting for him to make a mistake so they can tear into him with their criticism.

We can see, therefore, that instead of trying to make a subject as clear and simple as possible, that the tendency is just the reverse with many persons. One must remember that knowledge is not supposed to be the private property of a limited few. If one knows truth that others do not, he has an obligation to society to try to bring this truth to the entire world if he can do so. Too often scientists feel knowledge is exclusive property of science so they write only for the benefit of a select audience.

Yet, I daresay that this attitude defeats itself in the long run. One may be admired by a few who can understand him, when he could be looked up to by ten, a hundred, or a thousand times that number if he tried to reach a greater audience. Abraham Lincoln is considered great by great numbers of people because he presented great ideas simply. Even children understand what he meant.

Authorities on color, consequently, should refrain from using words seldom seen outside of the dictionary; inventing terms when existing words will suffice; labelling a phenomenon with such a word if a short few will amplify the meaning more for the reader, or if they can emphasize the meaning of an unknown word by giving a phrase of explanation; refrain from referring readers to so and so's theory without bothering to explain it, or giving a reference paper very unhandy to look up.

I find the practice of giving too many theories the names of their researchers objectionable. One gets the feeling that what started out as tribute to genius in other fields of science has got out of hand in the field of color. Bouquets are being given back and forth as if to be sure that one's name is plastered in the hall of fame as many times as possible. "I'll name one after you and you can name this one after me."

It becomes a convenience to mention such a theory by its short handle, but only the author and persons keeping abreast of all such papers can know what it is all about. Thus, instead of being a convenience, it is a distinct inconvenience to other readers, and the author is being very inconsiderate.

We see, therefore, that to remove the communications barriers, that we must take a look at ourselves rather than in just looking askance at the artists whom we cannot understand.

Don Francis Hill

AMERICAN MARIETTA AND WOOD COLOR

By the time you receive this Newsletter you will have found in your mail a copy of Wood Color in Relation to Illumination and Color Environment. This manual for architects prepared by Walter Granville for the American-Marietta Company is another example of the combination of elegant design and good taste in a serviceable manual. A previous manual (Color and Illumination Manual for Architects) was sent to the ISCC membership some time ago. The ISCC board is pleased that the American Marietta Company is willing to distribute this fine publication to the membership. It will take its place beside the first as an important source of information for the colorist.

THE NATURE OF ANIMAL COLOURS

The Nature of Animal Colours by Munro Fox and Gwynne Vevers. Macmillan, New York, 1960. xii + 246 pp. Illus. $6.50.

Not since 1953, when the other pigment-conscious Fox (Denis L.) brought out Animal Biochromes, has there been a convenient summing up of the causes of the hues we see in animals. In this new volume the authors provide a grand tour, conducted in a pleasantly readable style, and also a tantalizing invitation to do something about the pigments still awaiting investigation. A whole chapter is given over to laboratory experiments suitable for whetting the enthusiasm of students who might then go on to solve unknowns.

The table of contents may dismay the nonbiochemists, for the chapters are arranged to consider compounds in natural groups: melanin; sclerotin, ommochromes, Tyrian purple; carotenoids; hemoglobin, chlorocruorin; hemochromogens, porphyrins, bilins; hemocyanin, hemerythrin, hemovanadin; quinones; guanine, pterins, flavins; and a final miscellany. In none, however, will the nonbiochemist flounder in structural formulas. An appended chapter, "Synopsis of animal colours," clarifies the record by considering pigments by hue.

All through the book, the pages are sequined with esoteric bits of delightful information: fossilized melanin (150 million years old) used as ink in illustrating a scientific account of the extinct squids that made the pigment; colored sweat in human beings and red sweat in the hippopotamus; black rats turning gray one month after being given phenylthiocarbamide (the "PTC" of taste-test paper) in their food; the yellow color of a wasp differing completely from the yellow color of a mimicking fly.

Even the unknowns include surprises: the pigments of red hair, whether on a girl or on a red squirrel, and of precious coral still elude identification; the green of a turtle's fat, or of a crayfish's green glands, remains an enigma. Some of the known data border on the unrealized for most readers; the myoglobin of red muscle, rather than the hemoglobin of blood, is the chief color at the butcher shop; the pink hue of boiled ham is due to a different pigment; the

brown of overcooked beef is due to a third. The 17 handsome color plates will make readers eager to hunt down pigments in everything they see. A 612-entry list of references is a key to the pertinent literature.

Lorus J. Milne
Margery Milen
Durham, New Hampshire

Sent to the Newsletter by Kenneth Kelly. Reprinted from Science, 113, p. 695 (1961).

MISCELLANY Eye Colors Changed with Contact Lenses - San Francisco (UPI)

The National Eye Research Foundation has reported that half a million American women are wearing contact lenses in order to change the color of their eyes and that 40 per cent of them are changing their eyes to blue. The lenses come in 15 standard eye shades, but picking one isn't that simple. For example, a violet eyed woman who wants to change her eyes to gray needs yellow lenses.

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New Color Style in Fire Trucks -- Columbus, Ohio (AP)

Twenty-five years ago most fire trucks were red but the trend recently has been to varied colors so that emergency vehicles will stand out from the many red trucks on the street. Fire trucks now come in shades of white, yellow, gray, green, brown, orange, blue, and even black. But if you want a red truck, you can still get one -- in 25 shades from bright red to dark maroon. (And so dies one of our most effective color designations -- "fire engine red")

* * * * * *

'Atomic' Colors -- Rochester Times-Union by Fred Knubel

A young research chemist will continue studies at Oak Ridge, Tennessee, to find out, among other things, why deadly nuclear radiation can turn a piece of glass a variety of rich, unusual colors.

He is Eberhard Lell of Rochester, New York, who was picked by the U. S. Government in 1957 from Stuttgart, Germany, to do original research in this country.

For the past three years he's been working for Bausch and Lomb Inc. in cooperation with the Atomic Energy Commission, delving into the reasons why radiation affects glass. Some of Lell's work has helped scientists make satellite equipment containing lenses that are protected against discoloration from radiation in the upper atmosphere.

Currently, his most important work involves finding out why glass becomes protected against color change when certain metals are added to the basic mixture of sand, potash, soda, lime, aluminum oxide, and magnesium oxide.

Lell has found a parallel between certain impurities in the structure of glass and the permanent shades of color produced in it under nuclear radiation bombardment. He has also helped develop means of measuring the intensity of radiation by measuring the intensity of the colors produced.

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"Art of Color Matching," J. C. Holle, Prod. Finishing, 22, No. 12, pp. 64-82 (1958).

"'Balanced' Offset Process Inks," Paul J. Hartsuch, TAGA Proceedings, pp. 29-35, 206-207 (1958).

"Basic Considerations in Reflection Copy Color Reproduction," J. A. C. Yule and F. R. Clapper, TAGA Proceedings, pp. 163-174, 215-216 (1958).

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