M. Balcom

INTER-SOCIETY COLOR COUNCIL

NEWS LETTER

NUMBER 170 March-April 1964

PROBLEMS SUBCOMMITTEE PROGRAM AT ANNUAL MEETING

The Problem Subcommittee Meeting will be held on the first day of the Annual ISCC Meeting, Monday, May 4, at the Statler Hilton Hotel. The following is a schedule and room assignment.

Room	Subcommittee Number	Subject	Time
East	Problems 2 and 23	Color Names Kenneth L. Kelly, Chairman Expression of Historical Color Usage Everett R. Call, Chairman	9:30 a.m. - 12:00 p.m.
West	Problem 7	Color Specifications Francis Scofield, Chairman	9:30 a.m. - 12:00 p.m.
Cornell	Problem 10	Color Aptitude Test Forrest L. Dimmick, Chairman	9:30 a.m. - 12:00 p.m.
Pennsylvania	Problem 18	Colorimetry of Fluorescent Materials Eugene Allen, Chairman	9:30 a.m. - 12:00 p.m.
Schuyler	Problem 21	Standard Practice for Visual Examination of Small Color Differences Norman R. Pugh, Chairman	9:30 a.m. - 12:00 p.m.
East	Problem 14	The Colorimetry of Transparent Materials Wesley B. Reed, Chairman	2:30 p.m. - 4:30 p.m.
West	Problem 16	Standard Methods for Mounting Textile Samples for Colorimetric Measurement W. L. Matthews, Jr.	2:30 p.m. - 4:30 p.m.
Cornell	Problem 17	Color in Building Industry Waldron Faulkner, Chairman	2:30 p.m. - 4:30 p.m.

Room	Subcommittee Number	Subject	Time
To be Announced	Problem 20	Basic Elements of Color Education R. M. Hanes, Chairman	2:30 p.m. - 4:30 p.m.
Pennsylvania	Problem 22	Material Standards for Colorimetry of Opaque, Translucent, and Transparent Materials Fred W. Billmeyer, Jr., Chairman	2:30 p.m. - 4:30 p.m.
Schuyler	New Problems	Open meeting for discussion of ideas on new problems and problems procedures Roland E. Derby, Jr., Chairman	2:30 p.m. - 4:30 p.m.

SUBCOMMITTEE MEETING SUMMARIES AND AGENDA

The 1963 Subcommittee meetings on the day before the annual meeting were very well attended (two of them produced standing room only). These sessions have become an important and stimulating part of the annual meeting. Anyone interested in a problem is strongly urged to attend the subcommittee meeting and participate in the discussions following the business meeting of the committee.

Members with new problems or new aspects to old problems are invited to attend the meeting on "New Problems." Here emphasis is placed on current problems in color that may require formal subcommittee study by the ISCC.

A perusal of the reports of ISCC subcommittees from 1931 to the present clearly shows the many valuable contributions to the literature of color science made by these groups. It is doubtful if anyone active in the color field has not had occasion to refer to one or more of them. If the past excellence is to be maintained, the ISCC must have recourse to the talents of the most experienced and capable of its members. Let's give a little of your time in return for your debt to past committee efforts.

PROBLEM NO. 2 Color Names

Committee Membership:

Kenneth L. Kelly, Chairman
Room 305 East Building
National Bureau of Standards
Washington 25, D. C.

Deane B. Judd
Kenneth L. Kelly
Dorothy Nickerson

This meeting will consider the status of the centroid-color charts and any current problems with respect to their printing and publication by the National Bureau of Standards.

PROBLEM NO. 7 Color Specifications

Committee Membership:

Francis Scofield, Chairman
National Paint, Varnish and Lacquer Association
1500 Rhode Island Avenue, N. W.
Washington, D. C.

This subcommittee is engaged in a revision of the report on color specifications published some years ago (1956). The agenda of this meeting will be devoted to a discussion of progress on a draft of the revised report.

PROBLEM NO. 10 Color Aptitude Test

Committee Membership:

Forrest L. Dimmick, Chairman
U. S. Naval Submarine Base
P. O. Box 400
New London, Connecticut

Paul Blackmore
Robert Hefner

Carl Foss, Co-Chairman
72 Elm Road
Princeton, New Jersey

Ralph Pike
Sidney Newhall
Daniel Smith

Since the original production of test material has been exhausted this meeting will be devoted to a discussion of progress made in production of a new set. Possible modifications of the color aptitude test will be considered at this time.

PROBLEM NO. 14 The Colorimetry of Transparent Materials

Committee Membership:

W. B. Reed, Acting Chairman
American Optical Company
Southbridge, Massachusetts

G. J. Chamberlin

R. S. Hunter
G. W. Ingle
Francis Scofield
H. G. Shimp, Jr.
A. J. Werner

The study of single number color systems recently completed was reported at the last meeting. This report is being published by the Federation of Societies for Paint Technology.

In the immediate future, the committee will concern itself with keeping abreast of any developments pertinent to its assigned field of interest. It is hoped that this year's meeting will be attended by all individuals who are interested particularly if they may have suggestions as to possible specific areas which merit study by the committee.

PROBLEM NO. 16 Standard Methods for Mounting Textile Samples for Colorimetric Measurement

Committee Membership:

W. L. Matthews, Chairman
Chemstrand Company
Decatur, Alabama 35601

J. A. Cauataio
Theresa R. Commerford
R. E. Derby, Jr.
G. Goldwasser
R. F. Hoban
R. S. Hunter
Dorothy Nickerson
W. A. O'Brien
N. H. Pulling
F. J. Rizzo
E. Schweizer
C. R. Stock

The subcommittee is surveying methods for preparing and mounting textile samples for colorimetric measurement. These methods, with statistical data where available, will be published as a guide.

PROBLEM NO. 17 Color in the Building Industry

Committee Membership:

Waldron Faulkner, Chairman
1710 "H" Street, N. W.
Washington 6, D. C.

Katherine Chandler
Milo D. Folley
W. C. Granville
R. S. Hunter
K. L. Kelly
Dorothy Nickerson
Francis Scofield
Mildred Trimble

The application of color specifications to building materials will be considered. In addition, the possible use of the centroid colors (Problem 2) as a common system of identifying the color of building products will be reconsidered in light of the availability of the color charts published by the National Bureau of Standards.

PROBLEM NO. 18 Colorimetry of Fluorescent Materials

Committee Membership:

Eugene Allen, Chairman
American Cyanamid Company
Bound Brook, New Jersey

Seymour Goldwasser
Henry Hemmendinger
C. W. Jerome
D. B. Judd
Norman Macbeth
W. E. K. Middleton
Dorothy Nickerson
G. H. Patterson
R. A. Ward

The two main problems confronting this subcommittee are the establishment of a suitable light source to be used for the colorimetry of fluorescent materials and the specifications of adequate instrumental methods for such colorimetry. Although organized initially to consider the colored fluorescent dyes and pigments, the subcommittee decided at an early stage to concern itself also with fluorescent whitening agents.

At the forthcoming meeting of the subcommittee, there will be two main items on the agenda. The first is a report on a questionnaire which was widely circulated by the subcommittee last year at the request of Dr. Deane B. Judd. The questionnaire attempted to discover which light sources are mainly being used in evaluating fluorescent materials, and also tried to find out something about the methods used in making these evaluations. The results of the questionnaire were used by Dr. Judd as a basis for making recommendations to the CIE, which is currently deliberating changes in the standard light sources used for colorimetry. The second item concerns some comparative evaluations of fluorescent samples by different instrumental techniques.

PROBLEM NO. 20 Basic Elements of Color Education

Committee Membership:

Randall M. Hanes, Chairman
Applied Physics Laboratory
Johns Hopkins University
8621 Georgia Avenue
Silver Spring, Maryland

C. J. Bartleson, Jr.

This subcommittee was formed in 1954 for the purpose of reporting to the ISCC "a statement of the basic principles which should be included in any elementary teaching of color." The efforts of the first several years were directed primarily toward clarification of a working definition of the problem and the resolution of philosophical differences among individuals of very different backgrounds and interests. It was finally agreed that the term "basic" be restricted to color facts about which there is broad general agreement and that there be prepared a report that would be useful at any level of instruction.

A working outline of the report was achieved in 1956 and a first complete draft in 1958. This first draft was sent for comment to 33 individuals in the U. S. and abroad. More or less detailed comments were received from 19 of these individuals and, after most of their suggestions were incorporated, another draft of the text was submitted to the Board of Directors in December 1959. At that time an editorial committee was formed to review and improve the report. After much editing and re-editing of the text, plus selection and development of illustrations, a final draft was submitted to the Board in October 1961. Copies of that draft were distributed to the voting delegates of the ISCC for approval. While most of the delegates approved the report, several of them submitted suggestions for changes. All such suggestions were considered by the editorial committee, and all essential changes were made. Negotiations with various publishers finally resulted in the publication of the report in book form by John Wiley & Sons, Inc. in 1963, and the book was distributed to ISCC members.

At its meeting in October 1963 the Board agreed that this subcommittee be continued with the following objectives:

1. Monitor reaction to the present book.

2. Examine the possibility of producing another book on a more elementary level.

3. Explore the possibility of documenting the book by additional illustrations (in the form of charts, films, and/or slides).

4. Prepare a catalog of illustrative aids for teaching color.

The subcommittee plans to hold a closed meeting on the morning of May 4 and an open meeting on the afternoon of the same day. All interested persons are invited to attend the afternoon session.

PROBLEM NO. 21 Standard Practice for Visual Examination of Small Color Differences

Committee Membership:

Norman R. Pugh, Chairman
Sears Roebuck & Company
3301 West Arthington Street
Chicago 7, Illinois

C. J. Bartleson
M. Bruno
Hugh Campbell
C. E. Foss
K. C. Gale
W. D. Hall
H. K. Hammond
R. M. Hanes
Martha L. Hensley
S. J. Huey
W. J. Kiernan
R. W. McKinley
W. J. Morgan
D. N. Obenshain
Elizabeth D. Quackenbush
W. B. Reese
F. J. Rizzo
R. E. Rossell
Stewart Seass
Francis Scofield
R. C. Stillman
F. L. Wurzburg

This meeting will be devoted to a discussion of a preliminary report prepared by the subcommittee. The future direction of the subcommittee's work will also be considered.

PROBLEM NO. 22 Material Standards for the Colorimetry of Opaque, Translucent, and Transparent Materials

Committee Membership:

Fred W. Billmeyer, Jr., Chairman
Plastics Department
E. I. duPont de Nemours & Co., Inc.
Wilmington, Delaware

Carl E. Foss
Vice-Chairman
72 Elm Lane
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R. G. Alexander
W. Budde
S. L. Davidson
A. J. Derr
P. R. Douglas
P. M. Fisher
W. N. Hale
D. R. Hall
H. Hemmendinger
S. J. Huey
R. M. Johnston
W. J. Kiernan
N. M. Komodromos
D. I. Morley
H. F. Parker
R. F. Patrick
S. A. Powers
N. R. Pugh
W. L. Rhodes
J. L. Rood

M. Saltzman
F. Scofield
R. E. Seeber
D. Smith
H. B. Stevenson

I. Review of Scope, History and Accomplishments

In 1957, Committee E-12 of the American Society for Testing (and) Materials asked the Inter-Society Color Council to determine the types of materials most suited for use as stable, rugged standards, readily available in a wide range of colors, for use in instrumental measurements of the appearance attributes of materials. The initial objective of the Subcommittee for Problem 22 has been the selection of materials for standards for the colorimetry of transparent and opaque specimens. The chief property of interest for such materials is their long term color stability, evaluated through instrumental measurements of the highest precision and reproducibility.

Since the requirements on candidate materials are a direct function of the performance of the color measuring instruments with which they are to be used, and since the literature contains very little information on this subject, the subcommittee undertook a study of the performance in routine industrial use of one such instrument, the General Electric Recording Spectrophotometer, long considered the referee instrument for the determination of color coordinates such as CIE tristimulus values (as contrasted to the determination of color differences within pairs of samples).

II. Discussion of Report "Precision of Color Measurement with the G. E. Spectrophotometer"

ABSTRACT

A round-robin study of color measurement on the General Electric Recording Spectrophotometer was carried out by 15 participating laboratories. The samples included 5 glass filters for transmittance measurement and 4 opaque acrylic plastic and 10 opaque glass specimens for reflectance measurement. The results were expressed in terms of CIE luminous transmittance or reflectance, Y, and trichromatic coefficients x, y for Illuminant C (daylight), the reflectances being referred to MgO as standard, with the specular component excluded. 95% confidence limits for individual readings averaged ± 1.5% (range 4.7-0.4%) for Y and ± 0.0165 (range 0.1132-0.0007) for x and y if all the data were included. Elimination of results known or suspected to contain systematic errors reduced these values to ± 0.57% (range 1.37-0.25) for Y and ± 0.0119 (range 0.1284-0.0006) for x and y. The confidence limits for x and y are much greater for low luminance specimens (<15% transmittance or reflectance), averaging ± 0.0209 (range 0.1284-0.0018) for the selected data, compared to ± 0.0018 (range 0.0042-0.0006) for high luminance specimens (>25% transmittance or reflectance). The confidence limits for Y showed relatively little dependence on the level of transmittance or reflectance of the specimens. The repeatability of one spectrophotometer, with sample remaining in place for a series of successive measurements, averaged

± 0.09% for Y and ± 0.0007 for x and y, while for the same instrument the reproducibility over a 14-month period averaged ± 0.62% for Y and ± 0.0028 for x and y. Similar results were obtained with other spectrophotometers.

The results of this round-robin study cast serious doubts on the suitability of the procedures in general use for the calibration and operation of the B. E. spectrophotometer, long considered the referee instrument for "absolute" color measurement.

III. Discussion of New Objectives for the Subcommittee

From the conclusions of the report abstracted above, a possible future course for the deliberations of the Subcommittee for Problem 22 is clearly defined. It is to study and recommend suitable material standards, procedures for their use, and other pertinent techniques, for the calibration of spectrophotometers and colorimeters for improved precision and accuracy in industrial color measurement. Such a proposal will be made to the Board of Directors of the ISCC and subsequently to the committee membership at the 1964 annual meeting. If adopted, it will serve to guide the subcommittee's activities for the near future.

IV. Vote on Adoption of New Objectives

At this point, if necessary, the subcommittee will meet in closed session with limited attendance.

V. Consideration of Program for 1964-1965

1. Produce and test a calibration and operating procedure for the G. E. spectrophotometer meeting rigid requirements for high precision and accuracy.

2. Define and obtain material standards to implement the above procedure.

3. Test the procedure in a round-robin program.

4. Cooperate with ASTM Committee E-12 in background studies and suggestions for the revision of Methods D-307 and D-791.

5. Extend the above items to other spectrophotometers and to colorimeters.

PROBLEM NO. 23 Expression of Historical Color Usage

Committee Membership:

Everett R. Call, Chairman
National Paint, Varnish and Lacquer Assn.
1500 Rhode Island Avenue, N. W.
Washington, D. C.

Elizabeth Burris-Meyer
Walter C. Granville
Elschen Hood
Martha Jungerman
Kenneth L. Kelly
Frederic N. Rahr
Mary J. Shannon
William M. Stuart
Ouida M. Wessman
Beatrice West
Midge Wilson

The final meeting of this subcommittee--until the Council finds it advisable to reactivate it--will be held at this annual meeting. The work and results of the subcommittee will be reviewed. The chairman wishes to publicly thank all those who contributed so much.

ROBERT W. MATLACK APPOINTED EXECUTIVE SECRETARY OF THE FEDERATION OF SOCIETIES FOR PAINT TECHNOLOGY

Robert W. Matlack, Chairman of the Board and Treasurer of George D. Wetherill & Co., Inc., Philadelphia, Pa., was appointed Executive Secretary of the Federation of Societies for Paint Technology on February 29, 1964. The appointment, made by the Federation's Board of Directors, also assigns to Mr. Matlack the responsibilities of Manager of the Paint Industries' Show and Editor of the Official Digest, monthly journal of paint technology and engineering.

Mr. Matlack has been a member of the Federation and the Philadelphia Society for more than 25 years and served as Federation President in 1948-49. He has been Treasurer of the Paint Research Institute since its formation in 1957. In that same year, he was awarded the Federation's George Baugh Heckel Award for his outstanding contributions to the paint industry. In 1963, the Federation presented him a special award for "Twenty years of devoted service as a member of the Board of Directors or Finance Committee."

JAPANESE MARKET RESEARCH IN COLOR

The following items were submitted to the Newsletter by Kenneth L. Kelly. They represent the work of Japanese colorists paralleling the work of ISCC Problems Subcommittee 23, Expression of Historical Color Usage; and Problems Subcommittee 2, Color Names.

Material Color Standard for Market Research

(Plastics and Wooly)

In his letter of September 11, 1959, Mr. Takashi Hosono, Managing Director, Japan Fashion Color Association; and Art Director, Japan Color Research Institute, stated that he was sending me a copy of the booklet, "Color Code and Material Color Standard for Investigation of Colors." This booklet turned out to be two very interesting books each entitled Material Color Standard for Market Research, one for plastics and the other for woolens. Following are some observations on these books to be followed by two other reviews covering later articles on this subject by Mr. Hosono published in Studies of Color by Japan Color Research Institute.

The subject of color-usage research is of considerable interest to the Inter-Society Color Council because in October 1957, ISCC Subcommittee on Problem 23, the Expression of Historical Color Usage (the study of color trends) was established. The Co-chairmen were Mrs. Helen D. Taylor, Representative to the ISCC from the Tanner's Council of America and the Color Association of the United States, as well as color stylist of the W. T. Grant stores in New York; and Everett R. Call, Head of the Statistical Division of the National Paint, Varnish and Lacquer Association, and one of their representatives to the ISCC. The objective of this subcommittee was "To develop a technique of

expressing historical color usage of consumer products in order to facilitate intercomparisons among industries." This purpose was stated in more detail as "To derive compatible methods for recording historical consumer color preferences for products in individual industries, to publicize these methods and encourage all industries to adopt them so that (1) useful historical records of consumer preferences of their products may be available within individual industries, and (2) the interrelationship of consumer color preferences of one product upon the choice of another product may be established among industries." The last report of this subcommittee was prepared early in March 1960 and was transmitted to the delegates and members of the ISCC by letter of February 24, 1961. This is history but is important for the following discussion.

The roots of this enterprising project were laid in the National Paint, Varnish and Lacquer Association when Mr. Call prepared, through the NPVLA for the paint industry, the 1955 Color Survey. This survey utilized the ISCC-NBS Method of Designating Colors developed by the ISCC Subcommittee for Problem 2, Color Names, in collaboration with the National Bureau of Standards, as the basis of studying paint colors in conjunction with recognized statistical methods. The system formalized by Subcommittee 23 for describing the color of a product depending on the accuracy needed, is described in NBS Technical Note 152, Correlated Color Identifications for Industry.

On a visit to the National Bureau of Standards on October 29, 1959, Mr. Takashi Hosono presented to the writer two most interesting books, Material Color Standard for Market Research in Urea Resin, and Material Color Standard for Market Research Wooly, both prepared by color study groups of the Japan Fashion Color Association presumably under his direction. Unfortunately neither of these books contained the authors' names nor the dates of publication. Mr. Hosono stated that "these color codes were arranged in consideration of the advantages of the ISCC-NBS Method of designating colors available for color investigations." Each book contains a description of the development of, and methods used in preparing, the plastic and woolen samples illustrating the color names utilized in the codes, fortunately with English translations. This was a most ambitious project and duplicated very closely the methods developed by ISCC Subcommittee 23, as well as following them very closely in time.

The studies leading to the development of these two codes were carried out by the Market Research Group and the Color Study Group of the Japan Color Fashion Association in collaboration with the Japan Color Research Institute. In these studies, these groups used the Munsell Book of Color, the Guide to Color Standard by Japan Color Research Institute, the the Color Harmony Manual. Use also was made of the CIE coordinate system and standard observer, as well as the ISCC-NBS Method of Designating Colors.

The psychological color solid was partitioned into color "ranges" to each of which was assigned a color name and a colored sample illustrating that color name. The boundaries of each color range were determined in terms of the Munsell color charts and the Guide to Color Standard of Japan Color Research Institute. Different degrees of accuracy of color specification were established under four categories called fundamental, gross, medium, and minute. Under each of these categories the color solid is divided into 14, 30, 109, and 191 ranges respectively. The 14 fundamental ranges include pink, red,

orange, brown, yellow, yellow green, olive, green, blue green, blue, violet, purple, red purple, and neutral. In the gross classification there are added to these rose, beige, leaf, olive green, jade, turquoise, sky, saxe, lavender, lilac, mauve, and wine, with white, light gray, medium gray, dark gray, and black in place of the neutral range, making 30 in all. In the medium classification, these 30 color ranges are increased to 109 by the addition of the modifiers pale, light, vivid, deep, dull, and grayish. In the minute classification, these 109 color ranges are further divided into 191 smaller color ranges suitable for more accurate color description. There are 96 color samples (2 x 2 cm) in the code for plastics and 140 (2 x 3 cm) in the code for woolens. It was requested that trading firms reporting the colors of their products use either the Munsell Book of Color or Guide to Color Standard.

Realizing that the accuracy of specification of a color is increased if the color standards to which it is compared are made of the same material, the Japanese prepared two codes, one for textiles and the other for plastics. Each code contains typical colors used above a certain frequency in each industry. For each color sample there are given in tables the Material Color Standard color name and the Munsell renotation.

The Japan Fashion Color Association and the Japan Color Research Institute are to be highly commended for producing color codes in the form of such attractive books.

Studies in the Color Code for Market Survey

by Takashi Hosono

This review of the second publication from Japan on the subject of color marketing research is based on the article by Mr. Takashi Hosono with the above title published in Studies of Color of the Japan Color Research Institute 7, No. 3 (1960). Before commenting on this article I am going to reproduce the abstract in toto because it is self-explanatory.

> "Careful consideration should be given to the selection of a particular color code to meet the purpose of marketing in various color products. It must be designed to grasp systematically and comprehensively the current trend of colors.
>
> "The most suitable color code for meeting this proposition would be one based on the designation by color ranges. The ISCC-NBS method of designating colors, published in 1955, was established by dividing the color solid into 267 color name blocks. The detailed classification like the ISCC-NBS system is very appropriate to serve the purpose of giving all color names according to color ranges. But, it is somewhat too complicated to answer the purpose of surveying the trend of colors and of comparing and evaluating the ups and downs in the popularity of the range of each individual color.
>
> "The author has worked out the most convenient method of designating colors in accordance with the type of investigation needed. It is the classification which involves four classification systems in itself, fundamental, gross, medium, and minute. The fundamental classification system classifies

hues and neutrals into 16 ranges. The gross classification system divides the above 16 ranges into 29. The medium classification divides the above 29 ranges into 128 in terms of tones (pale, bright, deep, dark, etc.) according to lightness and saturation. The compilation from the data by means of the dividing of pale, bright, dark, etc., will be able to analyze precisely the trend of tones. When it is further necessary to detect the delicate trend of colors in vogue, we may refer to the minute classification system. It divides the 128 ranges in the medium classification system into 230, for example as in case of the subdividing of pink into purplish, medium, yellowish, etc.."

There are a number of interesting differences between the first publications (books) entitled Material Color Standard for Market Research and the present article. Most noticeable is the increase in the number of color ranges (equivalent to the color-name blocks in the ISCC-NBS method) in three of the four classifications, 14 to 16, 30 to 29, 109 to 128 and 191 to 230. In this respect the fineness of division of the color solid approaches that of the ISCC-NBS method except that in the latter the third level contained 150 divisions as compared to 128 in Mr. Hosono's system. ISCC Subcommittee 23 decided that this level was not necessary so it was deleted. Instead, Subcommittee 23 decided that finer divisions of the color solid were an absolute necessity so it added two more levels (equivalent to Mr. Hosono's classifications) in which the color solid was divided into 1500 to 150,000 color blocks using interpolated Munsell renotations, the Color Harmony Manual, Maerz and Paul, Ridgway or Plochere. The fifth level utilizes the CIE coordinate system and standard observer by which the color solid is divided into approximately 900,000 very small color blocks. These last two levels are very necessary when one must specify colors with very small tolerances, too small to use level three, the ISCC-NBS color names, and often too small to use an interpolated Munsell renotation.

The increase in the number of color ranges in the book in the medium and minute classifications is achieved by increasing the use of modifiers such as bright, strong, or dark grayish, while a number of unmodified hue names have been replaced by modifier-hue name combinations. Hue names yellow, olive, jade, saxe, and mauve have been eliminated while gold and brownish gold have been added. The form of the constant-hue chart showing the color ranges has been simplified somewhat.

An interesting system of indicating modifiers in an abbreviated form of color notation has been instituted in this article. The modifier vivid is indicated by the numeral 0, strong by 1, bright by 2, deep by 3, pale by 4, dark by 5, light by 6, dull by 7, light grayish by 8, grayish by 9, and dark grayish by 10. White is assigned the numeral 11, light gray 12, medium gray by 13, dark gray by 14, and black by 15. As a coarser breakdown where larger and fewer ranges are desired (reduced accuracy) these ten modifiers are grouped under the following five general modifiers: Pure includes vivid (0) and strong (1); Tint includes bright (2) and pale (4); Shade includes deep (3) and dark (5); Moderate includes light (6) and dull (7); and Grayish includes light grayish (8), grayish (9), and dark grayish (10). All hues are indicated by lower case letters, such as r for red, o for orange, wi for wine, or t for turquoise. Pink as differentiated from purplish or yellowish pink is indicated by m for medium as used in the early NPVLA Color Surveys. The abbreviation for a hue

name and modifier is given in this form, first the letter indicating the hue such as r. This is followed after a hyphen by the numeral indicating the modifier 1, 2, or 3, then another hyphen followed by the letter indicating the modifying hue. Examples of this notation are r-1-m for strong medium red or just strong red as differentiated from r-1-p for strong purplish red. Likewise s-4-g means pale greenish sky. There are other usages such as a prime mark after the numeral, a black dot over the numeral or a wavy line under the whole abbreviation but their explanations are given in the text which is in Japanese and my ability to read Japanese is still significantly poor.

Table 1 again contains all the color names given under the headings of the four classifications: fundamental, gross, medium, and minute. This table is identical with Table 1 in Material Color Standard for Market Research except as noted above.

Table 2 at the end of the article is constituted with the modified hue names along the top and the modifiers and their respective numbers down the left side. At the left of the modifiers are the general modifiers, Tint, Pure, Shade, Moderate, and Grayish. Horizontal and vertical lines divide the sheet into many rectangles, one for each hue-modifier combination. Most of the color range abbreviations are inserted in the appropriate rectangles. The writer was considerably confused by a number of inconsistencies noted in checking Table 1 against Table 2. It may well be that there is a reason for these which is explained in the text.

Studies in the Color Code for Market Survey

by Takashi Hosono

This is the third article on color marketing research and takes up all 28 pages of Volume 9, Number 3, 1962, of Studies of Color published by Japan Color Research Institute.

The Abstract reads- "The author has put to actual use his tentative plan of a color code for market survey, published in Vol. 7, No. 3 (1960), of this review, and the result has proved quite effective. He has improved to some extent on the above, and has finally established the color boundary and the representative color of each color block.

"According to his method, the fundamental classification gives 16 ranges, the gross 30, the medium 126, and the minute 230 (Table 1).

"A part of the division of each color block drawn on the improved Munsell system is shown in Figures 1 to 3. The relation to ISCC-NBS method of Designating Color Names is shown in the right column of Table 1. The color representing each block, established by the author, is not the central one, and yet is akin to the central (Table 1). Tables 2-8 are to be used for the summing-up and arranging of the market survey by means of this color code."

The text is short, being only three pages long. It discusses briefly the development of the system and then goes on to elaborate on the changes made in the individual color-name ranges or blocks. The general modifiers, Tint, Pure, Shade, Moderate, Grayish, White, Gray, and Black, are described as is the three-part abbreviation for each color-range name.

The color-range charts containing the color names have been modified somewhat as to boundaries and number of color ranges. They appear to resemble more closely the set of such charts in Material Color Standard for Market Research. Three examples of these charts are given, for 4.0R (3.2R - 4.7R), 5.0Y (4.2Y - 5.5Y) and 10.0B (8.7B - 1.0PB). A circular chart is included showing the hue-name succession with hue-designation numbers around the periphery which would indicate that there are 48 such charts in the set. There were 40 such charts in Material Color Standard for Market Research.

Table 1 again lists all the color-range names in the four classifications. In this article, the number of color ranges is the same in the fundamental classification (16), in the gross classification (30), three less in the medium classification (125), and still 230 in the minute classification. The hue names yellowish orange and yellowish beige have been deleted and there are fewer unmodified hue names than in the earlier Table 1. The notation in the "improved Munsell system" (renotation?) is listed for each representative color with its equivalent ISCC-NBS color name thus giving an equivalence necessary in converting from the author's system to the ISCC-NBS method or back. This is a very comprehensive table with all the color-range names given in both Japanese and English. It is interesting to note that although the author states that no more than 230 color ranges are needed in the minute classification as against 267 in the ISCC-NBS method, still there are 48 color-range charts in his system as compared to 31 in the ISCC-NBS method.

Tables 2-8 are similar to those in the former article and serve in the evaluation of the statistical usage of color. Again this writer is confused by the placing of the color-range names relative to the modifiers in the left hand columns. What appears to be an error or inconsistency may well be the expression of part of the whole plan whose explanation is contained in the Japanese text. It is hoped that the author will answer these questions for us in the near future.

Kenneth Kelly

REVIEW ARTICLES ON COLOR

Three excellent review articles on color were published by Review of Current Literature on the Paint and Allied Industries. The Review is a publication of the Paint Research Station, Teddington, England. These reviews were called to my attention by Max Saltzman who says, "The Review is, in my opinion, probably the best or certainly the most complete abstract journal in the field."

D. L. Tilleard, "Colour Systems and Atlases," XXXVI, No. 258, 831-941 (1963).

D. R. Duncan, "Modern Techniques of Colour Matching," XXXVI, No. 257, 847-855 (1963).

P. V. Foote, "Measurement of Colour and Colour Difference," XXXVII, No. 259, 1-11 (1964).

Each of the reviews is followed by an extensive and excellent bibliography.

The Newsletter has no information on the availability of these reviews. Those interested should write directly to the periodical.