

INTER-SOCIETY COLOR COUNCIL

NEWS LETTER

NUMBER 187

March-April 1967

36th ANNUAL MEETING

The 36th Annual Meeting of the Inter-Society Color Council will be held at the Statler Hilton Hotel, New York, N.Y., on Monday and Tuesday, June 12, 13, 1967. This date was selected to make it convenient for foreign visitors who will participate in the C.I.E. Meeting to attend the ISCC Meeting.

On Monday, June 12, meetings of the color problems subcommittees will be held.

On Tuesday, June 13, there will be a short business meeting at 9:30 a.m. At 10:30 a.m. an invited lecture will be given by Mr. Ralph M. Evans entitled "The Perception of Color". On Tuesday afternoon a seminar on Metamerism has been arranged by Dr. Gunter Wyszecki. The four speakers at this seminar will be: Mr. Walter Granville, Dr. A. Brockes, Mr. Isadore Nimeroff, and Dr. Eugene Allen.

The reception and banquet will be held on Tuesday evening. At that time the Godlove Award will be presented to Dr. Edwin I. Stearns. The banquet speaker will be Dr. W. D. Wright, Imperial College of Science and Technology, London, England.

The final announcement, advance registration blank and hotel reservation card will be sent out about May 1st by the Secretary.

PROBLEMS COMMITTEE PROGRAM AND AGENDA FOR MEETINGS

The meetings of the various sub-committees on the day before the Annual Meeting have become one of the highlights of an ISCC Program.

One of the most valuable functions of the ISCC, is the published reports of the various sub-committees. These reports represent the distilled ideas of many meetings. They are put in their final form by the hard, not infrequently unrewarding, work of the Chairman.

In order that these reports remain as authoritative and useful as they have been in the past, it is necessary to maintain an infusion of new ideas. Anyone interested in a problem is strongly urged to attend the sub-committee meeting and participate in the discussion.

Those with new problems or new approaches to old problems will find a ready forum at the meeting on "New Problems."

Roland E. Derby, Jr.
Problems Committee Chairman

Problem 7 - Survey of American Color Specifications
Robert F. Hoban, Chairman

This meeting will be concerned with a review of the status of committee work. Schedules and assignments of specification areas not already covered will be made.

Problem 10 - Color Aptitude Test
Forrest L. Dimmick and Carl E. Foss, Co-Chairman

At this meeting the major concern will be the reorganization of the sub-committee with respect to future directions. Any person interested in work on this type of problem should plan to attend.

Problem 16 - Standard Methods for Mounting Textile Samples for Colorimetric Measurements W. L. Matthews, Chairman

At this meeting the questions raised by the ISCC Board concerning the Interim Report will be considered. Additional procedures will also be discussed.

Problem 18 - Colorimetry of Fluorescent Materials
Eugene Allen, Chairman

The Main topic for this meeting will be a review of the scope of the problem by the new Chairman. Details of committee work for the next year will also be discussed.

Problem 21 - Standard Practices for Visual Examination of Small Color Differences Sam Huey, Chairman

All the criticisms and the suggestions of the proposed method, Standard Practices for Visual Examination of Small Color Differences, which was reviewed at our last meeting, have been incorporated into a final draft.

This final draft was submitted to all members and those who have regularly attended meetings of Problem 21. All those who reviewed the method found it to be satisfactory. These were several small editorial changes which were incorporated into the final method. The method was then submitted to the Chairman of the Problems Committee, for his consideration.

Any questions or criticisms from the Problems Committee, will be discussed at the June Meeting.

Problem 22 - Procedures and Material Standards for Accurate Color Measurement
Fred W. Billmeyer, Jr., Chairman

At the Annual Meeting, the following items will be considered:

1. Preliminary report on results of Round-Robin II: Rigorous Measurements with the G. E. Spectrophotometer.
2. Discussion of instructions and samples for Round-Robin III: Other Spectrophotometers.

3. Discussion of instructions and samples for Round-Robin IV: Color-Difference Measurement with Colorimeters.
4. Chairman's report on Subcommittee-related research at the Rensselaer Color Measurement Laboratory: Photometric Calibration of the General Electric Spectrophotometer.
5. Discussion leading to implementation of the subcommittee's objectives to design and produce pertinent material standards.
6. New business (by prearrangement with the Chairman or from the floor).

Problem 24 - Catalog of Color Measuring Instruments
Ruth M. Johnston

Since the last meeting, assignments of particular instruments to individual committee members have been made. A detailed report concerned with the following factors will be considered for each assigned instrument:

- I. Basic factors in the specification of what is to be measured:
 - A. Conditions of illumination and viewing.
 - B. Type of light for which color description is given.
 - C. Form of presentation of measured quantities.
- II. Other aspects of instruments characteristics of importance in the evaluation of the measured data:
 - A. Type of wavelength control device.
 - B. Detectors - photomultiplier, photocell, null device.
 - C. Description of data reduction methods.
- III. Accessories available.
- IV. Price Range.
- V. Annotated bibliography.

Problem 25 - Determination of the Strengths of Colorants
Charles G. Leete, Chairman

This meeting will review the progress to date and outline the work schedule for the following year. Specific assignments of test methods will be made, hence, anyone interested should attend.

Problem 27 - Metamerism Index
Isadore Nimeroff, Chairman

Since this will be the first formal meeting of this committee, the Problem and Scope are reviewed here:

Problem: A match is achieved when there is a simultaneous equality of the integrated values of the three responses of the normal observer.

This condition is satisfied with an exact spectral match and may be satisfied without a spectral match. In the latter case, the match is said to be metameric. The problem is to determine, for a metameric match, the quantity of spectral mismatch (metamerism index).

- Scope:
1. To find a suitable general procedure for evaluating metamerism.
 2. To find suitable limited procedures for evaluating metamerism for special situations.

The meeting will concern itself with the formation of working groups as follows:

- a) Specimen preparation and collection.
- b) General metamerism indexes.
- c) Special metamerism indexes.

Problem 30 - Color in the Building Industry
Milo D. Folley

At this meeting, progress in application of Munsell notation to color specification in the building industry will be reviewed.

Other color problems specific to the building industry will also be discussed. Anyone who has an interest or a special color problem is invited to attend.

REPRINTS ENCLOSED
WITH THIS ISSUE

A paper from the Williamsburg conference:

"An Automatic Digital Colorimeter for Laboratory and Process Control Applications" by John W. Ward.

An article that appeared in the July-August 1966 issue of Color Engineering, entitled "Matrix Algebra for Colorimetrists" by Eugene Allen.

CIE MEETING
IN WASHINGTON

The Commission Internationale de l'Éclairage (CIE) will hold its 16th Session on June 19-28, 1967, at the Shoreham Hotel in Washington, D.C. While passing mention of this meeting has been made in the most recent issues of the N.L., more formal note of such an important meeting is indicated. In fact, a few refresher notes about the CIE would probably not be amiss for some readers.

The CIE was established in 1913 to provide for international cooperation in all phases of illumination and to establish international standards. There are, at the present time, 28 member countries with working National Committees, and in addition, ten countries are Associate Members. The principal work of the CIE is accomplished by Committees of Experts (E Committees) and Reporting Committees (S Committees), whose members represent the world's outstanding experts in their fields.

The Session will bring together in one place the results of lighting research and development in many parts of the world during the past four years. Approximately 20 formal papers and 45 reports are to be presented. A complete listing of the titles of these reports and papers is inappropriate here, of course, and a partial listing would necessarily favor the interest of some readers at the expense of others. Therefore, a general observation will have to suffice; it

would be very difficult to think of any ISCC member or group that would not find some part of the program professionally interesting.

Arrangements have been made for a limited number of non-delegates to attend the Session. Registration for the full meeting will be \$50 (\$35 for accompanying ladies), and registration for a single day will be about \$5. Further information can be obtained from Louis E. Barbrow, National Bureau of Standards, Washington, D.C. 20234.

NEW MEMBERS The following applications for individual membership were accepted at the last meeting of the Board of Directors, held in Colonie, New York, on March 4, 1967.

Mr. V. M. Abdulla
Aktiebolaget Platmanufaktur
Technical Division
Fack, Malmo 1, Sweden

Miss Patricia Bresden
Latham, Tyler, Jensen Inc.
153 East Huron
Chicago, Illinois 60611

Mrs. Maria DaRocha
Sun Chemical Corporation
441 Tompkins Avenue
Staten Island, New York 10305

Mr. Robert W. Dobles
250 Kartes Drive
Rochester, N. Y. 14616

Mr. Paul Fink-Jensen
Athensvej 28
Copenhagen S, Denmark

Prof. Robert J. Fletcher
Dept. of Ophthalmic Optics
The City University
Cranwood Street
London, E.C. 1, England

Mr. Charles E. Garland
E. I. du Pont de Nemours & Company
Chambers Works - Process Dept.
Deepwater, N. J. 08023

Mr. Harvey F. George
Gravure Research Institute
22 Manhasset Avenue
Port Washington, N. Y. 11050

Miss Margaret Halstead
9 Lowther Drive
Enfield, Middlesex, England

Mr. Anders Hard
Swedish Colour Centre
Tegnergatan 24
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Stockholm 45, Sweden

Miss Suzanne Jones
646 Washington St.
Cumberland, Md. 21502

Mr. Andreas Kornerup
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Copenhagen S, Denmark

Mr. Rolf Kuehni
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Union, New Jersey 07083

Mrs. Myrtle Loehr
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18111 Nordhoff St.
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Mr. Roberto D. Lozano
Instituto Nacional de Tecnologia Industrial
Laboratorio de Radiaciones
Departamento de Fisica
Libertad 1235
Buenos Aires, Argentina

Mr. Charles C. Lumpkin
199 Spencer Place
Ridgewood, N. J. 07450

Mr. James A. Meacham
21 Williams St.
Milan, Ohio 44846

Dr. Robert E. Phillips
G. K. Turner Associates
2524 Pulgas Avenue
Palo Alto, California 94303

Mr. Charles K. Pollack
Columbian Carbon Co.
601 Cass Street
Trenton, N. J. 08611

Miss Lorna Staples
University of Massachusetts
Dept. of Food Science & Technology
Amherst, Mass. 01003

Mr. Allyn S. Rashkin
The Ruberoid Co.
P. O. Box 128
Vails Gate, New York 12584

Mr. Alfred J. Stern
P. O. Box 52537
Houston, Texas 77052

Mr. Rene Willis
938 Grandridge Court
Holland, Michigan 49423

AAPL HONORS
RALPH EVANS

The American Artists' Professional League held its annual meeting on Sunday evening, March 19, at the Fifth Avenue Hotel in New York. Mr. Frank C. Wright, Chairman of the delegation from the AAPL to the ISCC and also currently President of the AAPL, presided at the meeting. After the banquet Mr. Wright presented awards to the winners of this year's competition. He then introduced ISCC Secretary, Ralph M. Evans, who gave his lecture "The Perception of Color". After the lecture Mr. Wright presented Mr. Evans with an AAPL Distinguished Service Award "for his consuming scientific pursuit of the causes, effects, and perception of color, and his clear communication of his findings to others."

Ed. note: In reporting this award to the N.L., Mr. Wright paid a fine general tribute to Mr. Evans and gave special encomium to the lecture. Mr. Wright stated: "I consider this paper a break-through, and am sure the audience at the June meeting [of the ISCC] will find it useful, clear, and exciting. Ralph certainly has the combination of an omnivorous curiosity, a scientist's approach, and an artist's ability to relate and clarify."

FRANK C. WRIGHT
NEW PRESIDENT
OF CAAS

Frank C. Wright has been elected president of the Council of American Artist Societies. This Council, founded in 1962, has 75 members from local art societies that represent about 18,500 artists. The Council was formed to serve as a "central representative body for art on a national scale".

WALDRON FAULKNER
ELECTED TO NATIONAL
ACADEMY OF DESIGN

Waldron Faulkner, well-known to ISCC members as a former president and as chairman of the AIA delegation, has been made an associate member of the National Academy of Design. The Academy was founded in 1825 and has as its members some 400 painters, sculptors, graphic artists, architects, and aquarellists. It has as its objectives the cultivation and extension of the arts of design and the education of art students.

Mr. Faulkner has had an interesting and distinguished career. Born in Paris of American parents, he was educated in the U.S. at the Gunnery School (Washington, Conn.), Sheffield Scientific School (Ph.B. in mechanical engineering), Yale Graduate School, and Yale School of Fine Arts, where he received a B.F.A. degree in 1924 and was awarded the A.I.A. student medal and the Alice Kimball English traveling scholarship.

After working briefly in two architectural firms, Mr. Faulkner opened his own office in New York in 1927. His work consisted largely of residential and educational buildings, among which was restoration of the Blair House in Washington, D.C.

Not long after moving to Washington, D.C. in 1934, Mr. Faulkner started the firm of which he is now senior partner (Faulkner, Stenhouse, Fryer, and Faulkner). Since then, his work has consisted mainly of institutional buildings for The George Washington University and The American University, and he has been Consulting Architect for Vassar College (1938-53).

Mr. Faulkner has served in numerous public service and professional groups other than the ISCC, frequently as the president. Some examples are: Joint Commission on Church Architecture and the Allied Arts, the Washington Housing Association (President, 1947-50), and D.C. Board of Examiners and Registers of Architects. In addition to his membership in the ISCC, he is at the present time a member of the Yale Club of D.C. (President 1943-44), Cosmos Club (President 1953), The Council of the Corcoran Gallery of Art, The Washington Building Congress, and numerous other groups.

Among Mr. Faulkner's publications are "Color Problems of the Architect" and "Summary of the Color Symposium" (AIA Convention Seminar, 1949). He has lectured on color in the building industry and in church architecture.

The manner of election to the Academy is noteworthy. Upon nomination by a member, the prospective member submits examples of his work for exhibition. If his work is judged to be of sufficient merit, he becomes an associate member-elect, whereupon he is required to have a portrait painted and submit it for approval. If the portrait is approved, the candidate becomes an associate member. If the painting is unacceptable, another must be made or a photograph substituted for approval.

Election to full membership can come only as vacancies occur.

DR. MIDDLETON WRITES
HISTORY OF THERMOMETER

ISCC friends of Dr. W. E. Knowles Middleton, many of whom have known him in connection with the work of ISCC Committee on Problem 18, will be interested to know that the Johns Hopkins Press (Baltimore, Md. 21218) has recently announced publication of still another of the historical books he has been writing since his retirement from the National Research Council of Canada. Dr. Middleton's hobby has been his interest in the history of various instruments concerned with the science of atmospheric optics. This new book is A History of the Thermometer and Its Use in Meteorology, 256 pages, illustrated, price \$10. Previously published are: The History of the Barometer, A History of the Theories of Rain, Meteorological Instruments, and Vision Through the Atmosphere. Dr. Middleton and his wife are presently living in England. We were glad to greet them when they came back for a few months last year on a visit to family and friends in Canada, followed by a few weeks spent at the Smithsonian in Washington. In 1959 Dr. Middleton was awarded the Ives Medal of the Optical Society of America for distinguished work in optics.

D.N.

RPI ANNOUNCES
COLOR COURSES

Under the auspices of the Division of Special Programs, Rensselaer Polytechnic Institute, The Rensselaer Color Measurement Laboratory will offer two color courses this summer. The first, July 10-July 14, a special comprehensive short course in the Principles of Color Technology, is described in the brochure accompanying this issue of the N.L. The second, a limited-attendance laboratory course in Advanced Color Measurement, is a first-time offering and will be held from August 28 to Sept. 1, 1967. Both will be under the direction of Professor Fred W. Billmeyer, Jr., who will be assisted by the staff of the laboratory and by experts in the field of color measurements serving as guest instructors.

The principal topics in the Advanced Color Measurement course will be: Accurate Colorimetric Spectrophotometry, Precise Colorimetry, Geometric Aspects of Color Measurement, Color-Difference Measurement and Computation, and Color-Mixing Laws. Instrumentation appropriate to the topics will be provided. Registration will be limited to twelve, a number commensurate with the advanced nature of the course. Tuition for the course, including textbooks and supplies, is \$400. Hours will be 9:00 a.m. - 5:30 p.m., Monday, Aug. 28 - Thursday, Aug. 31, and 9:00 a.m. - 1:00 p.m., Friday, Sept. 1. Application for registration should be made by letter to Professor Billmeyer, stating the qualifications of the applicant. Applications must be received before July 28, 1967, and will be honored on a first-come, first-served basis among qualified applicants. Tuition is payable to Rensselaer Polytechnic Institute, Division of Special Programs, on notification of acceptance to the course but not later than August 28.

ALUMINUM ASSOCIATION
ADOPTS MUNSELL NOTATION

Milo Folley, chairman of the Sub-committee for Problem No. 30, Color in the Building Industry, has reported that a recent brochure of the Aluminum Association showing standard colors for painted sheet aluminum provides Munsell notations for the colors. This step is encouraging, for the sub-committee is attempting to get standard terminology adopted throughout the industry.

IDL COLOR INSTRUMENTATION SEMINARS

Instrument Development Laboratories is conducting a series of seminars on color and color measurement. These seminars are described as technical in nature and designed to provide participants with fundamental understanding of color theory and of the use of instrumentation to solve practical industrial problems.

For the convenience of participants, the seminars are condensed courses, two days long, and are held in various parts of the country. Six of them were held in March and April. The remaining seven are scheduled as follows:

May	8-9	Detroit, Michigan
May	11-12	Pittsburgh, Pennsylvania
June	5-6	Kingston, Ontario
Sept.	11-12	New Jersey
Oct.	30-31	Attleboro, Massachusetts
Nov.	2-3	Chicago, Illinois
Nov.	6-7	Louisville, Kentucky

Main topics in the course outline are: General Introduction to Color Theory; Evaluation of Color Differences; Formulation of New Colors Using Instrumentation; Basic Instrument Design, Reference Standards and Sample Measurement; Discussion

of Special Problems; Recommendations on How to Establish Your Own Color Instrumentation Program.

Further information can be obtained by writing to: Seminar Coordinator, IDL, 67 Mechanic Street, Attleboro, Mass. 02703.

THE COLOUR COUNCIL
OF CANADA

Due to the death of Mr. Wilfred Skitch, Secretary-Treasurer, the following new officers were appointed:

Secretary - Mr. Harry Nellis
Treasurer - Mr. G. Franklin Dean

The April meeting of the Council was devoted to the subject "Flowers in Colour", with Mr. Tom Colin as the speaker.

DRUPA in Düsseldorf The 1967 DRUPA International Fair will be held in Düsseldorf, Germany, 26 May - 8 June 1967. DRUPA is the largest market of the graphic arts world, and is truly a triple-Oberbürgermeister-sized affair. According to a bulletin of the National Association of Photo-Lithographers, the 1962 DRUPA had 678 exhibitors covering 829,000 sq.ft., with an attendance of 432,000.

The Fair is planned to provide a comprehensive survey of printing and paper-converting machinery of every type; printers' equipment, materials, and supplies; and materials and equipment for the paper manufacturing industry and the graphic arts. Many ISCC members are expected to attend.

FSPT ANNOUNCES
MATTIELLO LECTURER

According to a news release from the Federation of Societies for Paint Technology, Fred B. Stieg, Jr., Manager of the Technical Service Dept., Titanium Pigment Corp., will present the Joseph J. Mattiello Lecture at the 45th Annual Meeting of the Federation to be held at the Municipal Convention Hall, Minneapolis, Minn., Oct. 15-18, 1967. The title of the lecture will be "Particle Size as a Paint Formulating Parameter".

Mr. Stieg was the first investigator to develop a mathematical relationship between particle spacing and hiding power in titanium pigments, and he exerted a very considerable influence on the technology of alkyd flat wall paints.

PHILLIP M. ENGEL DIES

Phillip M. Engel, president of Instrument Development Laboratories, Attleboro, Mass., died after a short illness on February 19, 1967.

Born in 1901, Mr. Engel obtained a B.Sc. degree in electrical engineering from Drexel Institute, Philadelphia, in 1924. Most of his industrial career was spent with the General Electric Company. He entered the field of optics during the war, receiving the Bureau of Ordnance award for exceptional service in the development of anti-aircraft gunsights while with the Sperry Gyroscope Company.

In 1947 he joined Instrument Development Laboratories, now a subsidiary of Kollmorgen Corporation, where he assumed the duties of president in 1962. He supplied senior engineering judgement as well as executive responsibility for IDL's comprehensive line of color-measuring instruments, including the

"Color-Eye" colorimeter-abridged spectrophotometers, continuous color-monitoring equipment, shade sorters, and color-difference and analysis computers.

DR. ELSIE MURRAY

--IN MEMORIAM

On September 30, 1965, in Athens, Pennsylvania - the town where she was born on September 17, 1878 - Dr. Elsie Murray died. In the spring of 1964 her neighbors found her unconscious in her home in critical condition with pneumonia. After some time in the hospital she was taken to the Proper Nursing Home where she resided until her death. Although failing rapidly a few weeks before her death, she still managed to be up and about and interested in her many projects. Death came quickly while she was sitting in a chair reading her mail.

Known and respected for her work in color vision research and testing, Dr. Murray was a well-known figure at early ISCC meetings which she attended from 1937 to 1948 as a delegate of the American Psychological Association, thereafter as an individual member. In February of 1965 she was made an honorary member of the ISCC.

Dr. Murray's color vision work was done at Cornell where her laboratory consisted of two rooms in Morrill Hall. A few years ago Mrs. Toby Clarey, on the staff at Cornell, wrote to a number of Dr. Murray's fellow-scientists to request personal observations of her and her work that she might use in a story for the alumni journal that she was preparing on this very remarkable woman. Because of illness and death in her own family Mrs. Clarey was unable to complete the story before Dr. Murray's death. She has been kind enough to allow us to use her unfinished draft, prepared shortly after she had spent an afternoon in February, 1965, with Miss Murray in the nursing home, as a basis for the following story.

While we are late in learning of her death, we believe that Elsie Murray was so unusual a person in the color field that ISCC members will find her story of interest. Because the ISCC News Letter will reach so many of her friends and acquaintances we present her story here, with our thanks to Mrs. Toby Clarey.

DR. ELSIE MURRAY, SCIENTIST

In February of 1965 one of the world's distinguished women scientists, and at that time one of Cornell's oldest living alumni, sat in a convalescent home in Athens, Pa., still, at 86, studying and working - not only in her chosen field, color vision and color blindness, but as a regional historian and humanitarian as well.

Dr. Elsie Murray, Cornell 1904, called the mass of papers and books piled around her bed, chair and bureau "a scandal," but our visit with this remarkable woman left us astounded at the spirit and wit and vitality which even then dominated her frail body. Twenty years before THE VALLEY NEWS, her home town paper, paid Miss Murray a tribute in a feature story called "Red Roses to the Living." That account described her life as a fit example of Chaucer's ideal scholar, "he who would gladly teach and learn." And indeed on the day we visited her in 1965 Elsie Murray was still gladly learning and although no longer able to teach in a formal sense, the marvellous stories she could still tell of her long life and of a career that brought fame to Cornell in her circumscribed field, only leads one to borrow a cliché and call her "the most unforgettable character I have ever met."

This Cornellian was a devout exponent of the philosophy of a broad base in science, and friends who knew her well, like Prof. Helen Cady of the College of Home Economics, consider this philosophy one of her distinguishing characteristics. Miss Murray attributed her love of the natural sciences to the text books her mother had saved from her own years at Wells College. Dr. Murray's love of geology, trees and birds she attributed first to the long excursions into the woods and hills around her native Athens, and second to her association with Dr. Liberty Hyde Bailey and the Comstock and Fuertes families at Cornell.

Her mother, Louise Welles Murray, who at 18 had been the youngest girl graduate of Wells College, had great ambitions for her daughter Elsie, one of three sisters. Her standards were high and she decided that Bryn Mawr had more to offer her daughter than her own Alma Mater, much to the disappointment of Wells recruiters. Then, too, at this time Elsie showed promise as a pianist - she often practiced eight hours a day - and Mrs. Murray made arrangements for a well-known Philadelphia teacher to come to Bryn Mawr to give lessons to the budding concert artist. Just prior to this time, the first of several breaks in Elsie's educational progress had occurred. She had graduated from high school at fifteen but since three languages were required to enter Bryn Mawr she stayed home for a year to read French and German, and concentrate on her piano practice.

Dr. Murray's story of her life at Bryn Mawr is a chapter in itself. It seems "those Quakers" frowned on the concert aspirations. Indeed, "they relied on a tuning fork!" This was later accepted philosophically, as all for the best, particularly since her left hand, she felt, may have lacked the necessary dexterity. However, it was a talent that later served her in good stead when she taught piano to help finance her education. She tells how the athletic director would not allow her to play on the tennis and basketball teams, which she passionately wished to do, because her face "flushed," a physical manifestation which in those days was considered a sure sign of heart trouble!

Her transfer to Cornell was the result of a number of factors. First was her health, an asthmatic condition developed at Bryn Mawr which kept her at home for two years. Second, a change took place in the family fortunes and a struggle for funds began. But Louise Murray did not intend to let financial problems thwart her plans for her daughter. She borrowed money from an uncle in Chicago, justifiably it would seem, in order to continue her daughter in college.

One of the paradoxes of Elsie Murray's life is that in spite of the tremendous vitality she generated, nevertheless uncertain health shadowed all of her life. In all humility and with no bitterness she told us that she had not made of her life what she had hoped. "It was foggy between the two rivers, the Susquehanna and the Chemung, and the dust was fearful in those days. Athens always plagued me. I got hoarse frequently and would have to go to the Adirondacks in August." It was easy for us to see that even then, in spite of all that she had accomplished, she still regretted the time that had to be taken from study because of her health. Her mother finally settled on Cornell because it was nearby and she erroneously believed the climate of Ithaca would improve her daughter's asthma.

Until now Elsie had been torn between history and biology. In Ithaca she first turned to nature study under Liberty Hyde Bailey, and following this she turned

to medicine. About the time she came to Cornell psychology was coming into its own, and the University was beginning to offer excellent courses and fellowships in this field. In the end she took her degree in psychology with a minor in physiology - a choice she never regretted.

There were interruptions in her college years but these Dr. Murray now counts as blessings in disguise. She would stop a year or more to teach and earn, to earn and travel abroad, to rest and study - but always to return with renewed enthusiasm - "to pick and choose" her courses. In addition to Sans Souci, her first assignment, her teaching career includes Sweet Briar, Vassar, Wells and the University of Illinois.

On one of her sabbatical leaves Miss Murray was greatly influenced by Prof. Thorndike under whom she studied at Columbia. Her interest in color blindness came later and was initiated by a rare case of a woman deviate, color blindness being almost exclusively a male characteristic. From that time until now color vision has been her chosen field.

Another chief interest has been in the history of the region in which she lived. Following her mother, for many years she was director (1932-1955) and then historian (1955-) of the Tioga Point Museum in Athens. Like her mother, her interest in local history was aroused because of her descent from one of the original French refugee colonists of the village of French Azilum, founded in Bradford County, Pennsylvania, in 1793. As a result she has written many articles on French Azilum, as well as on the Pennsylvania Indians. (Her will left everything she had to French Azilum, Inc.)

Professor Emeritus Karl M. Dallenbach, who knew Elsie Murray for over fifty years, tells how some forty-odd years ago Prof. E. B. Titchener, under whom she obtained her Ph.D. in 1907, granted her two rooms in Morrill Hall to set up as a laboratory to conduct experiments in color vision. She was made Senior Research Associate, but aside from the use of these two rooms she received nothing else in the way of remuneration from the University - no salary - no benefits - no retirement. "But," says Prof. James Gibson, present Department chairman, "that was the way she wanted it." Dr. Dallenbach says he never heard her express regret that she retired from her academic position. He also feels her persistence in pursuing her research under unfavorable and trying conditions indicates where her heart was.

Both Prof. Gibson and Prof. Arthur Ryan describe the courage of this dauntless woman as she braved the president and heads of foundations seeking - and getting - grants to carry on her work. Living frugally and caring nothing for personal adornment, she would wear the same type shirtwaist and skirt costume year in and year out. It is said that once when she was to present a paper before a national scientific conference, Prof. Titchener ordered her to buy a new hat! When told that a former associate at Cornell had spoken of her with high regard, she laughed her hearty, contagious laugh and said, "Did he say that? We did not get along at all."

Almost a recluse, members of the department would not see her for weeks at a time. Yet if heat were needed in the building they tell me she could always get Buildings and Properties there "faster than anybody." Frank Wellin, mechanic, believes she had a higher opinion of male graduate students than

their female counterparts. He also relates the iron rule she set down and enforced that nobody outside be allowed to disturb anything in her jealously guarded two-room sanctum. "But I don't blame her a bit," he adds.

The story is told of one of her graduate assistants going to her apartment in College Town to work with her on a project in progress. When he got inside every inch of space was covered with notes and papers, except the bed. "But when we got through," he said, "her notes and papers covered that, too."

In spite of her scornful disregard of financial remuneration, outside the laboratory Dr. Murray had a mind of her own on investment matters. She invested regularly in sound conservative securities, always knew what she wanted when she entered a brokerage office, and was never persuaded to change her mind.

A member of many scientific societies and a contributor to many scientific journals, Dr. Murray's articles and reviews are works of art upon which she spent countless hours of meticulous care. Dr. Leo Hurvich, for years one of her colleagues, believes that her long experience and years of research in color vision and color blindness gave her a "better understanding of the way the mechanism works than many prominent scientists and engineers who seem to seek and get popular attention and acclaim." Dr. Hurvich says that he and Mrs. Hurvich always hoped Elsie Murray would be at Optical Society meetings because conversations with her were "sparkling, witty, stimulating and to the point."

Dr. Forrest Lee Dimmick, formerly with the Naval Medical Research Laboratory, had known Miss Murray since 1935. He is another long-time associate who thinks highly of her opinions and who appreciates her support of a 4-primary system of color theory. Dr. Dimmick feels that her criticisms and analyses of papers were always valuable and refreshing, and that her critical approach was "perhaps more valuable than a few data would have been from additional completed experimental studies." All her colleagues reiterate that even the "other camp" of color-theorists, the tri-stimulus people, respected Dr. Murray's opinion and thought highly of her.

Among those who admired the Cornellian while sometimes taking a different viewpoint was Dorothy Nickerson, who says that Elsie Murray's "wonderful and forceful use of the English language in exposing many of the ignorant and fraudulent claims made in the early years regarding color vision tests and testing, was most refreshing." There is no doubt that the lady from Morrill Hall was quite uninhibited in saying just what she thought about claims in her field which she considered misleading or incorrect. She made quite a damning evaluation of the Holmgren test in an Optical Society paper on which Miss Nickerson raised a few questions as they were cooperating in preparing the paper for publication. Considerable correspondence ensued between the two women, and finally in one letter Dr. Murray declared that Miss Nickerson's concern for Holmgren made her wonder "if he might not be your uncle!" The memory of this incident Dorothy Nickerson says she has treasured for years - it was outspoken and typical. Like everyone contacted for material on this eighty-six year old scientist, she too marvels that Dr. Murray could retain for so long her wit and vitality and personality and sums it up well when she says, "Sounds just like her. May her tribe increase!"

Dr. Murray's apparatus has been stored and the two rooms in Morrill Hall are now being used for other purposes. Students at Cornell are no longer tested

for color blindness in any systematic way. Dr. Gibson says, "It is too bad, but there it is. The department is interested but we cannot afford a specialist." So now there is no one to continue the specialty for which Elsie Murray made Cornell famous. At present Elsie Murray's monument lies in her contributions in helping to solve the riddle of color vision. At eighty-six, this lady, while still studying and working with characteristic optimism, declared, "Some day I hope to write the full account of my contact with deviate cases." Unfortunately this was not possible.

According to the personnel at the home when I was there, Dr. Murray was still carrying on a considerable correspondence. When we left she bounded up the hall after us like a girl - with an afterthought. And the next day she wrote us two letters. Indeed, we agree with Dorothy Nickerson's summation, "May her tribe increase!"

No complete list of Dr. Murray's publications is available. A list of over 30 articles relating to color vision and about a dozen articles relating to her historical items, has been compiled by Mrs. Clarey. It includes criticisms and book reviews, most often published in the American Journal of Psychology or other psychological journals. They range by date from 1908 to 1959. Her Ph.D. thesis was published in 1909, Organic Sensation, Am.J.Psych.XX,386-446. In 1943 the Optical Society of America held a symposium on color blindness at which she presented an invited paper: Evolution of Color Vision Tests, published in the J. Optical Soc. Am., 33, 316-334. It contains a 52-item bibliography.

COLOR
CONNOTATION

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D.N.

Wright, Benjamin and Gardner, Burleigh. Effect of color on black and white pictures. Percept. Mot. Skills, 1960, 11, 301-304.

It has long been known that colors have meanings and that the contexts in which colors appear have an effect on their connotations. But what are the details of this effect? What meanings do colors have? When introduced into a situation, do colors simply add their meaning, or is there an interaction between color and context, which creates new meanings not found in either alone? This report describes the effect of red, blue, and yellow on the meaning of three black and white pictures. To measure meaning we used an Osgood "semantic differential" (Osgood, 1957, pp. 76-85) of 29 adjective-pairs. Ss were 930 Chicago men ranging in age from 25 to 55. Two-thirds were in blue collar, clerical or sales work; the rest were professional or managerial.

Interviews were conducted in transportation and recreation centers under the fairly uniform lighting conditions found there. Ss were invited to participate in a study of color. Those who agreed were screened with an Ishihara card and then each was asked to give his reactions first to a picture and then to a color. Colors were presented as 2" squares mounted on 12"x 15" white cardboard. Pictures were 12"x 15".

Judgments of three colors alone and of four versions of each of three pictures were obtained. The first version was black and white. In each of the other three versions one background color was introduced. The amount of color varied in three steps from an area about equal to that of the 2" square to an area about 10 times as great.

The picture-color combinations were rotated from interview to interview to balance out the effect of prior picture rating on subsequent color rating. Since no person rated more than one picture and one color, comparisons among pictures or among colors are for independent samples. Samples were comparable in age, education, and occupation.

The average ratings of the three differently colored versions of the three pictures on each adjective-pair were analyzed in 29 3 x 3 analyses of variance. Mean squares due to color dominated these analyses, indicating the primacy of the color effect. The color-picture ratings were averaged over pictures to yield one overall estimate of color influence for each adjective-pair.

The data were next reduced in a second way. Factor analysis of the 29 adjective-pairs over average ratings for the 15 color-picture objects showed that four clusters of meaning accounted for three-quarters of the covariation:

(a) exciting/calming, lively/quiet, fast/slow, hot/cold, loud/soft, sharp/dull;
 (b) safe/dangerous, relaxed/tense, familiar/strange; (c) good/bad, clean/dirty, pretty/ugly; and (d) strong/weak, deep/shallow. The clusters correspond closely with Osgood's major semantic dimensions of Activity, Evaluation, and Potency (1957, pp. 71-75).

For expository convenience each cluster was represented by an average score on its two leading adjective-pairs: "Exciting" by exciting and lively, "Safe" by safe and relaxed, "Good" by good and clean, and "Strong" by strong and deep. These will be referred to as the connotations of: "Exciting," "Safe," "Good," and "Strong".

The scores on these connotations for colors and for pictures are given in Table 1. Scores are average departures from the middle of a 7-step rating scale

TABLE 1
 Connotations of Red, Blue and Yellow and Their Effects on
 Connotations of Black and White Pictures

Object Rated	Connotation†								Sample n
	Good		Safe		Strong		Exciting		
	M	Sm	M	Sm	M	Sm	M	Sm	
Colors*									
Red	1.87†	.08	0.05	.13	2.03	.07	1.90	.07	292
Blue	2.05	.07	1.71	.08	1.36	.08	0.19	.12	397
Yellow	1.74	.06	1.21	.10	0.48	.11	-0.02	.13	<u>241</u>
Pictures**									
Uncolored	1.51	.08	1.25	.10	0.68	.12	-0.29	.13	243
Red	1.99	.09	1.38	.10	1.08	.12	0.30	.13	228
Blue	1.57	.11	1.11	.10	0.76	.12	-0.18	.12	229
Yellow	1.41	.10	0.79	.10	0.38	.14	-0.27	.12	<u>230</u>
									930

*Ostwald color notations are: 6.5 na, 18 la, 2 na.

**Picture A: a family standing around a new car. Picture B: two hands holding a strip of adding machine tape. Picture C: a plan of an adding machine keyboard and a large question mark.

†Scores on each of these connotations are averaged ratings on two adjective-

pairs selected to represent the connotation, i.e., Good: good/bad, clean/dirty;
 Safe: safe/dangerous, relaxed/tense; Strong: strong/weak, deep/shallow;
 Exciting: exciting/calming, lively/quiet.

†Scores range from +3 in favor of a connotation to -3 in favor of its opposite.
Zero represents a rating scale midpoint.

in the direction of the adjective heading the column. Scores can range from +3 in favor of a meaning to -3 in favor of its opposite. The precision of each score is given by its standard error.

There are two questions to put to Table 1. (a) Which meanings are the colors or pictures judged to have, i.e., which scores are substantially far from the scale midpoint of zero? (b) How do the colors and pictures differ in meaning, i.e., which scores are substantially different from each other?

All colors are judged "Good." Blue is judged more "good" than yellow. Red falls in between. Only blue and yellow are judged "safe," blue more than yellow. All three colors are judged "Strong," red the most, yellow the least. Only red is judged "Exciting." Thus, blue is judged the "Good-Safe" color, while red is judged the "Strong-Exciting" one. This corresponds closely with previous research on the meanings of color (Luckiesch, 1923; Collins, 1924; Allesch, 1925; Lewinski, 1938; Ross, 1938; Wexner, 1954; Murray & Deabler, 1957; Osgood, 1957, pp. 291-302).

What happens when these colors are added to pictures? If red is the "Strong-Exciting" color, are the red pictures the "Strong" and "Exciting" pictures? The answer is "Yes." The rankings of all three colors and identically colored pictures correspond exactly on "Strong" and "Exciting." This is consistent with an additive explanation of the influence of color on meaning. When color is introduced into a context, the meaning of the context moves in the direction of the meaning of the introduced color.

What about the color blue and the meanings "Good" and "Safe?" If blue is the "Good-Safe" color, does the introduction of blue produce the most "Good" and the most "Safe" pictures? The answer is "No." The addition of blue hardly changes the meaning of the pictures. It is the addition of red, the least "Safe" color, which produces the most "Good" and the most "Safe" pictures. Actually, neither red nor black and white pictures are judged as "Good" or as "Safe" as their combination. An additive explanation of color meaning is not sufficient to account for these data. Some interactional explanation is called for.

SUMMARY

On the connotations "Strong" and "Exciting" the effect of color can be viewed as an additive one. On "Good" and "Safe" the data require consideration of a color-context interaction, out of which emerge new levels of meaning not found in color or context alone. The essence of this phenomenon is brought out by red. Red alone is most exciting but least safe. Red in context is also most exciting. But the red pictures are more "Good" than and at least as "Safe" as the uncolored pictures or, the blue pictures. "Why is the stimulation produced by red least safe and good when presented as a square of color, but most safe and good when presented as part of a picture?"

Our interpretation is that the conceptual organization embodied by the picture modifies the threatening color stimulus so that it becomes safe, while the stimulus value of the color increases the liveliness of the conceptual organization represented by the picture, so that it becomes more pleasurable. This interpretation is consistent with the proposals of Schachtel (1943), Rickers-Ovsiankina (1943) and Fortier (1953) concerning the effect of color in the Rorschach, and with Goldstein's (1942) observations on the different effects of red and green on the organism.

We propose that the black and white pictures represent too much control, while the square of red represents too much impulse and that their combination produces a color-form balance less provocative of anxiety, yet more emotionally satisfying than either alone. The preference for the red pictures over red alone or over black-and-white pictures seems to us to be an indication of the human organism's need for the right amount of stimulation, of the need to maintain a balance between the avoidance of too much and the search for enough; a balance between the longing for peace and the hunger for life.

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MISCELLANY Cure for Liver Trouble. As every shopper (except, perhaps, Betty Furness) knows, liver sausage that has been on the display counter for a while loses its "fresh" pink appearance. This problem (for the grocer) has reportedly been solved by chemists at Merck & Co. According to an article in Chemical and Engineering News (Sept. 19, 1966), the Merck men have discovered a compound, Neo-Cebitate (sodium salt of isoascorbic acid) that gives liver sausage color stability two to four times longer than that of untreated meat.

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