

Inter-Society Color Council *Newsletter*

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ANNUAL MEETING ISSUE

EXPOSITION, EXPLORATION, EXPOSTULATION AND FUN AT ANNUAL MEETING

The 1969 Annual Meeting in New York City on April 13 and 14 included numerous good reports covering a wide range of interests, a search for improved procedures, occasional remonstrance, and general enjoyment.

Monday morning and part of the afternoon were devoted to Problems Subcommittee meetings, which were generally well attended, and (for the first time) individual member and member-body liaison meetings, which were not. Reports covering these activities are included elsewhere in this issue of the N.L.

The luncheon for delegates and officers was productive and is expected to be a regular feature of the Annual Meeting.

On Monday afternoon a Forum on Designing and Merchandising, arranged by Midge Wilson and chaired by Karl Fink, explored men's fashions (Robert L. Green, Fashion Director, *Playboy Magazine*), women's fashions (Jules Tomschin, Vice-President, Chardon-Marché), interior design (Irving L. Harper, Partner, Harper & George), carpeting (Walter Guinan, President, Karastan Rug Mills), and psychological considerations (Leo and Dorothea Hurvich). This interesting session was enlivened by an unscheduled disputation between one of the speakers and a member of the audience.

In the evening an instructive screening of motion pictures related to color and design, arranged by Milo Folley, was held at the Fashion Institute of Technology.

Activities on Tuesday began with the customary business meeting, with reports by officers, committees, and a few of the delegations. These reports, plus others not given orally, are included in this issue of the N.L.

Following the business session, Dorothy Nickerson presented a comprehensive history of the Munsell

Color System. This very interesting and well-received report will be published in Color Engineering.

The afternoon was devoted to the symposium on "Color Measuring Instruments," arranged and chaired by Ruth M. Johnston, of Davidson and Hemmendinger. After opening remarks by Miss Johnston, the following papers were presented: "Comparative Performance of Color Measuring Instruments," by Fred W. Billmeyer, Jr., Rensselaer Polytechnic Institute; "Goniospectrophotometer for Color Measurements," Henry Hemmendinger, Davidson & Hemmendinger; "Continuous Color Monitors," Henry F. Parker, PPG Industries; "Automatic Shade Sorters," Melvin R. Johnston, University of Tennessee; and "Looking Ahead," George P. Bentley, Kollmorgen Corp. Much interest in this subject was shown by the good attendance and extended discussion.

During the informal reception before dinner, Professor Forbes Whiteside demonstrated and entertained with the "Synchroma," an instrument that projects abstract images whose color and motion are controlled by electronic signals. The Synchroma is the invention of Stanley Elliott of Cleveland, Ohio; Professor Whiteside designs the visual material, selects the sound, and works with sound composers and performing musicians for combined sound-image programs.

Highlighting the banquet were the presentation of the Godlove Award to Professor Harry Helson and the address by Jack Lenor Larsen. Walter C. Granville, Chairman of the Godlove Award Committee, announced the Godlove Award recipient and introduced Deane B. Judd, who made the citation. Dr. Judd's entertaining and instructive citation is included in its entirety later in this issue of the N.L. Professor Helson's gracious acceptance and his amusing anecdotes about Godlove, Judd, and himself are not available at this time for publication but did serve as a fitting climax to the presentation.

Mr. Larsen, a fabric designer, spoke about color considerations from a designer's point of view, not only in terms of aesthetics but also with respect to sales and styling, production and profit. He used many striking and effective color slides to illustrate his concepts.

Midge Wilson, chairman of the banquet committee, provided a colorful environment for the dinner. Karl Fink, Program Committee Chairman, deserves high praise for his arrangements, but he insists that much of the credit belongs to Midge Wilson.

**DR. HARRY HELSON RECEIVES GODLOVE
AWARD FOR 1969**

Report of Godlove Award Committee, by Walter C. Granville, Chairman. Ralph M. Evans, Karl Fink, W. J. Kiernan, and Ralph Pike, Members

Some members of the Council may not have known Dr. Godlove in whose honor and memory this award is made, so I would like to say a few words about him. Dr. Godlove was both a chemist and a physicist. Yet his knowledge of the art field was such that he was asked to write on the early history of the art of coloration in the OSA's Science of Color. His contributions to the ISCC News Letter, of which he was editor for many years, are classics. To me, his comprehensive knowledge of all aspects of color epitomizes the ideal member of the Council.

For the recipient of this year's Godlove Award, the committee has nominated Dr. Harry Helson. The principal basis for making the award to Dr. Helson will be made clear by Dr. Deane B. Judd whom I wish to thank for preparing the award citation. You will soon be aware of our good fortune that he accepted this responsibility. Dr. Judd.

CITATION

Prepared and presented by Dr. Deane B. Judd

Because of my long friendship and collaboration with Dr. Helson I have been asked by Walter C. Granville, Chairman, Godlove Award Committee for 1969, to prepare and present the citation. I am most happy to accept this assignment. The committee has nominated Dr. Helson because of his work on the principle of adaptation level and its application to the appearance of colors. I highly approve of their choice of Dr. Helson for this award, and will now try to make clear why.

Dr. Helson received the degree of Doctor of Philosophy from Harvard University in 1924. His thesis was on the Psychology of Gestalt and states that all of the parts of the environment combine to influence the responses of an observer, and that the form in which the parts are combined may be crucial. A corollary to this thesis is that to analyze the environment into parts, each to be studied separately, is often foredoomed to failure. Synthesis of the responses to the separate parts to predict the response to the total situation is often impossible. The principle of adaptation level conforms to this thesis that the situation must be evaluated as a totality, but more of this later.

I met Harry Helson in the fall of 1924 at Cornell University where he was an instructor in the Department of Psychology. There Harry and I carried out our first collaborative work, A Study of Photopic Adaptation.

A year later (1925-26) found him still an instructor of

psychology, but at the University of Illinois, and here an event occurred that has had repercussions within the Inter-Society Color Council for many years. Harry befriended a student of chemistry working there on his Ph.D. Many arguments ensued about color, color from the psychological viewpoint on the one hand, and color from the pigment-chemistry viewpoint on the other. The student of chemistry was none other than I. H. Godlove, and Dr. Godlove told me years later that his life-long interest in color stemmed from these arguments with Harry Helson.

For the ensuing forty-three years Dr. Helson has been a professor of psychology at one or another of the following institutions: University of Kansas, Bryn Mawr College, University of Texas, Brooklyn College, Leland Stanford University, York University, and University of Massachusetts at Amherst, his present post. During war-time (1942-44) he was in charge of NDRC Research on visual tracking at the Foxboro Company, and later (1952-54) he was director of the Radio-Biological Laboratory of the University of Texas and the U. S. Air Force. He served as editor of the Psychological Bulletin from 1958 to 1964.

The years of teaching were for Harry Helson also years of directing the research of his graduate students, of carrying out his own research, and of writing up the results for publication. In the bibliography appended to this citation are listed about 50 references to his publications related to color; and, to give an idea of the breadth of Dr. Helson's interests, there has been added a supplementary list of about 75 references to publications not related to color. The achievements for which we are honoring Dr. Helson are thus seen to be the result of but a minor part of his scientific effort.

The Inter-Society Color Council is by no means the first to consider Dr. Helson's work worthy of special commendation. In 1959 he received the Howard Crosby Warren Medal of the Society of Experimental Psychologists, and in 1962, the Distinguished Scientific Contribution Award of the American Psychological Association. Such is the caliber of the man who for many years served us as delegate from that Association, and whom we are here to honor this evening.

For a statement of the principle of adaptation level we may turn to Dr. Helson's book, Adaptation-Level Theory (1964), pp. 62-63: "In every situation confronting the organism there is established an adaptation level that is a weighted mean of focal, background, and residual stimuli. Adaptation level represents the zero of function, and, since it is always associated with positive values of stimulation, stimuli below as well as above level exert positive effects on behavior. Responses to stimulation are manifestations of positive or negative gradients from level."

Now what does the "zero of function" mean for color appearance? It is the function required to produce the perception middle gray.

Given the generalized statement of a situation, an observer confronted with a stimulus pattern filling his field of view, how do you derive the adaptation level from the stimulus situation? The adaptation level is approximated by a weighted mean of focal, background, and residual stimuli; focal is the word for what you are looking at, background of course means the surround, and residual stimuli mean for color the effects of what you were looking at last. Thus as you glance around at the stimulus pattern, the adaptation level may change continuously. As Dr. Helson (p. 59) states: "What is focal at one moment may become background or residual at the next."

What kind of mean, and how weighted, yields the adaptation level? Dr. Helson has found best correlation with experiment by taking a geometrical mean of these three types of stimuli for the various parts of the visual field and weighting the stimuli for these parts in proportion to their angular size. Note that introduction of a stimulus far from the adaptation level into a part of the visual field tends to be self-negating. This introduction changes the adaptation level toward the new stimulus, and so reduces the stimulus gradient between adaptation level and the new stimulus.

You will forgive me if I discuss adaptation level and its connection with the appearance of colors at some length. In the first place, I have the suspicion that not everybody understands this connection with crystal clarity, and secondly, do not forget that Dr. Helson's contributions to this subject form the basis of his nomination for the Godlove award.

You have often heard a statement to the effect that "the eye is very good for detecting color differences, but you can't depend on it for absolute judgments of color." The reason why you can't depend on the eye for absolute color judgments is that the adaptation level often changes from moment to moment. Fluctuations in absolute judgments of color are largely fluctuations in adaptation level.

You have heard about color constancy. What has color constancy to do with adaptation level? Adaptation level explains color constancy. The principle of color constancy states that the color perceived to belong to a given object changes only slightly compared to the change in color of light used to illuminate the object and its environment. Thus a piece of paper having a spectrally nonselective reflectance of about 20% (like Munsell N 5/), looks gray either in full sunlight, or by the dim greenish light of the deep forest, or by the yellow light of a candle. How does adaptation level explain this? As the environment and the N 5/ paper change together from sunlight, to greenish light, and finally to yellow light, the adaptation level goes hand-in-hand with it: so the perception of the color belonging to the N 5/ paper remains gray, even though the light reflected from the paper into the observer's eye changes from sunlight, to greenish light, to yellow light.

Is there anything more to the principle of adaptation level than to the principle of color constancy? Yes, there is much more. To check on the extent to which it is possible to alter the chromatic character of the illuminant without appreciably changing the colors perceived to belong to a series of objects taken from the Munsell neutral series ranging from black to white, Dr. Helson set one of his graduate students (Virginia Balough Jeffers) at Bryn Mawr to collecting reports of the appearance of these objects for four spectrally very selective illuminants of red, yellow, green, and blue hues. By the principle of color constancy, these gray objects should have appeared gray or nearly gray regardless of the illuminant, and regardless of whether the background was black, gray, or white. The experimental facts were found to be very clear. For each background essentially only one of these objects was perceived as gray; this object, and this object alone, corresponds to the adaptation level. Members of the Munsell neutral series reflecting a higher fraction of the incident light took on more and more of a tinge of the illuminant hue the more they departed from the adaptation level; those darker than the adaptation level were seen as having hues complementary to that of the illuminant. In this work by Helson and Jeffers (1940), the idea of adaptation level announced in 1938 was amply verified. The departures from middle gray observed experimentally correspond to gradients above and below adaptation level.

In summarizing these experiments, Dr. Helson (p. 261) states that the adaptation level depends in large measure on reflectance of the background, because of its relatively large area, and that adaptation reflectance tends to approximate background reflectance. The adaptation chromaticity also tends to approximate the chromaticity of the background. Better approximations to adaptation level than these simple uncorrected averages have since been derived; see, for example, the important paper by Helson and Michels (1948). They showed that the adaptation level might correspond to any chromaticity at all provided the background color had nearly this chromaticity and had the proper luminance ratio to the focal stimulus. The concept of adaptation level serves to explain not only the approximate constancy of object-color perceptions for moderate changes in illuminant color, but also the considerable departures from object-color constancy found experimentally for larger changes in illuminant color.

At the time Dr. Helson was in process of formulating the concept of adaptation level, I was in the midst of a frustrating attempt to develop a theory by which to predict the colors perceived to belong to objects viewed within any environment and lit by any kind of light. I had experimental data from eight members of the staff of the National Bureau of Standards in the form of estimates of the hues, lightnesses, and saturations of the colors that they perceived for a group of spectrally selective Munsell papers viewed under conditions nearly the same as those used by Dr. Helson's graduate

student, Virginia Jeffers. My attempts to adapt the familiar three-components theory to predictions of such color perceptions gave very poor predictions; so I turned to the opponent-colors theory, but I couldn't make that unfamiliar theory work either. By using the concept of adaptation level, however, I finally constructed an awkward empirical model that gave predictions in encouraging accord with the experimental facts. Once a way of predicting for each environment the specification of the color that the observer will call gray, the problem of predicting the hues and saturations that the observer will say belong to the neighboring colors is more than half solved. As I look through my report (1940) of this work I fail to find any explicit acknowledgment that the crucial idea that makes the empirical model work at all is that of adaptation level. Nor did I state explicitly that I am indebted to Dr. Helson for formulating this crucial idea. I find only a definition of adaptation reflectance as a clue to this indebtedness. Adaptation reflectance is defined as the reflectance at which a sample of the same chromaticity as the background appears most nearly achromatic, a function of the whole viewing situation.

I am glad of this chance to set the record straight by acknowledging my debt to the insight of Dr. Helson. Actual theories of color perception will be formulated in the future by mathematicians more gifted than I. They will be simple, elegant, and more successful than my awkward empirical model. These theories will use the idea of adaptation level, and their success will be due to it.

So, I say that Dr. Harry Helson, by formulating the concept of adaptation level, subsequently shown by him to be an extremely general concept applicable to a wide variety of human behavior, has made an essential contribution to our understanding of color perception, present and future. For this contribution the duly constituted committee of this Inter-Society Color Council has chosen Dr. Harry Helson for the Godlove Award for 1969, an award that he richly deserves.

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Publications Related to Color by Dr. Harry Helson:

The Psychology of Gestalt. Amer. J. Psychol., 1925, 36, 342-370; 494-526.

The Psychology of Gestalt. Amer. J. Psychol., 1926, 37, 25-62; 189-223.

The Effects of Direct Stimulation of the Blind Spot. Amer. J. Psychol., 1929, 41, 345-397.

A New Visual Phenomenon--the Cigarette Illusion. Psychol. Rev., 1930, 71, 536-537.

New Experiments upon Photopic Adaptation and the Classic Laws of Adaptation. Psychol. Bull., 1931, 28, 709-710.

The Cigarette Illusion--A Case of Color Transformation. Amer. J. Psychol., 1931, 43, 691-700.

A Study in Photopic Adaptation. J. exp. Psychol., 1932, 15, 380-398. (with D. B. Judd).

The Fundamental Propositions of Gestalt Psychology. Psychol. Rev., 1933, 40, 13-32.

A Child's Spontaneous Reports of Imagery. Amer. J. Psychol., 1933, 45, 360-361.

The Relation of Visual Sensitivity to the Amount of Retinal Pigmentation. J. gen. Psychol., 1933, 9, 58-76. (with J. P. Guilford).

How Do We See in the Blind Spot? J. exp. Psychol., 1934, 17, 763-772.

An Experimental and Theoretical Study of Changes in Surface Colors Under Changing Illuminations. Psychol. Bull., 1936, 33, 740-741. (with D. B. Judd).

Tri-Dimensional Analysis and the Non-Film Modes of Color Appearance. J. Opt. Soc. Amer., 1937, 27, 59.

Fundamental Problems in Color Vision. 1. The Principle Governing Changes in Hue, Lightness, and Saturation of Non-Selective Samples in Chromatic Illumination. J. exp. Psychol., 1938, 23, 439-476.

Color Constancy, Conversion, Contrast, and Adaptation. Psychol. Bull., 1938, 35, 672-673.

Effects of Certain Variables on Hue, Lightness, and Saturation of Samples Having Identical Trilinear Coordinates. J. Opt. Soc. Amer., 1939, 29, 260.

Color Tolerances As Affected by Changes in Composition and Intensity of Illumination and Reflectance of Background. Amer. J. Psychol., 1939, 52, 406-412.

Fundamental Problems in Color Vision. 2. Hue, Lightness, and Saturation of Selective Samples in Chromatic Illumination. J. exp. Psychol., 1940, 26, 1-27. (with V. B. Jeffers).

Color Perception, Acuity, and Space Perception. S. W. Fernberger (Ed.) Psychol. Bull., 1941, 38, 433-440.

Multiple-Variable Analysis of Factors Affecting Lightness and Saturation. Amer. J. Psychol., 1942, 55, 46-57.

Some Factors and Implications of Color Constancy. J. Opt. Soc. Amer., 1942, 33, 555-567.

Changes in Hue, Lightness, and Saturation of Surface Colors in Passing from Daylight to Incandescent-Lamp Light. J. Opt. Soc. Amer., 1947, 37, 387-395. (with J. Grove).

The Effect of Chromatic Adaptation on Achromaticity. J. Opt. Soc. Amer., 1948, 38, 1025-1032. (with W. C. Michels).

A Reformulation of the Fechner Law in Terms of Adaptation-Level Applied to Rating Scale Data. Amer. J. Psychol., 1949, 62, 355-368. (with W. C. Michels).

Theoretical Foundations of Psychology. New York: Van Nostrand, 1951. (Editor).

Perception. In H. Helson (Ed.), Theoretical Foundations of Psychology. New York: Van Nostrand, 1951.

Vision. Annu. Rev. Psychol., 1952, 3, 55-84.

Object-Color Changes from Daylight to Incandescent-Filament Illumination. Illum. Engr., 1952, 47, 221-233. (with D. B. Judd and M. H. Warren).

Man as a Meter. Physics Today, 1953, 6, 4-7. (with W. C. Michels).

Der Mensch als physikalisches Messinstrument. Phys. Bl., 1954, 10, 114-118. (with W. C. Michels).

Color and Vision. Illum. Engr., 1954, 49, 92-93.

The Use of Comparative Rating Scales for the Evaluation of Psychophysical Data. Amer. J. Psychol., 1954, 67, 321-326. (with W. C. Michels, and A. Sturgeon).

Color and Seeing. Illum. Engr., 1955, 50, 271-278.

Color Rendition with Fluorescent Sources of Illumination. Illum. Engr., 1956, 51, 329-346. (with D. B. Judd and Martha Wilson).

A Study of the Witte-Konig Paradoxical Fusion Effect. Amer. J. Psychol., 1958, 71, 316-320. (with A. E. Wilkinson).

Adaptation-Level Theory. In S. Koch (Ed.), Psychology: A Study of a Science. Vol. I. New York: McGraw-Hill, 1959, 565-621.

A Quantitative Study of Reversal of Classical Lightness-Contrast. Amer. J. Psychol., 1959, 72, 530-538. (with F. H. Rohles, Jr.).

The Pleasantness of Color: Object, Source, and Background. West. Arch. Engr., 1961, 221, 35-37.

Domains of Lightness, Assimilation and Contrast. Psychol. Beitr., 1962, 6, 405-415. (with V. L. Joy).

Studies of Anomalous Contrast and Assimilation. J. Opt. Soc. Amer., 1963, 53, 179-184.

Current Trends and Issues in Adaptation-Level Theory. Amer. Psychol., 1964, 19, 26-38.

Adaptation-Level Theory: An Experimental and Systematic Approach to Behavior. New York: Harper and Row, 1964, xvii-732.

Perception. In Contemporary Approaches to Psychology, Princeton: D. Van Nostrand, 1967, 311-343. (with W. Bevan, Editor).

Contemporary Approaches to Psychology. Princeton: D. Van Nostrand, 1967, xii-596. (with W. Bevan, Editor).

Autobiography. In A History of Psychology in Autobiography, Vol. V. New York: Appleton-Century-Crofts, 1967, 195-220.

Constancy. International Encyclopedia of the Social Sciences. New York: McMillan and Free Press, 1968, 11, 544-546.

The Role of Spectral Energy of Source and Background Color on the Pleasantness of Object Colors. Illum. Engr. In Press, 1969. (with T. Lansford).

Publications Not Related to Color by Dr. Harry Helson

Insight in the White Rat. J. exp. Psychol., 1927, 10, 278-296.

Some Anomalies in Nerve Regeneration. Psychol. Bull., 1927, 24, 192-193.

The Effects Obtained from Rotation of Irregularly Formed Regions. In Proc. 9th Int. Congr. Psychol., Princeton: Psychological Review Company, 1929, 219-220.

A Modified Kinohapt. In Proc. 9th Int. Congr. Psychol., Princeton: Psychological Review Company, 1929, 67-68. (with S. H. Bartley).

Eye-Movements and the Phi-Phenomenon. Amer. J. Psychol., 1929, 41, 595-606. (with J. P. Guilford).

The Tau Effect--an Example of Psychological Relativity. Science, 1930, 71, 536-537.

The Nature and Problem of Perception. In R. H. Wheeler (Ed.), Readings in Psychology. New York: Crowell, 1930, 389-408.

The Tau Effect--an Example of Psychological Relativity. J. exp. Psychol., 1931, 14, 202-217. (with S. M. King).

New Experiments upon Photopic Adaptation and the Classic Laws of Adaptation. Psychol. Bull., 1931, 28, 709-710.

Group Presentation in the Method of Constant Stimuli

as a Time-saving Device. Amer. J. Psychol., 1931, 43, 422-433. (with D. Shaad).

Studies in the Theory of Perception: The Clearness-Context Theory. Psychol. Rev., 1932, 39, 44-72.

The Role of Form in Perception. Amer. J. Psychol., 1932, 44, 79-102. (with E. V. Fehrer).

The Part Played by the Sympathetic System as an Afferent Mechanism in the Region of the Trigemini. Brain, 1932, 55, 114-121.

Wilcox on "the Role of Form in Perception:" A Rejoinder. Amer. J. Psychol., 1933, 45, 171-173.

Changes in Skin Temperature Following Intense Stimulation. J. exp. Psychol., 1934, 17, 20-35. (with L. Quantius).

The Relation Between Instructions and Past Experience in a Simple Observational Task. J. educ. Psychol., 1934, 25, 29-38.

Demonstration of Pupillary, Accommodative, and Consensual Reflexes through Changes in Apparent Size of a Pinhole. J. gen. Psychol., 1934, 13, 186-188.

Prediction and Control of Judgments from Tactual Single-Point Stimulation. Amer. J. Psychol., 1936, 48, 609-616. (with R. H. Burgert).

On Statistical Methods of Comparing Heavy Mineral Suites. Amer. J. Sci., 1936, 32, 392-395.

Size-Constancy of the Projected After-Image. Amer. J. Psychol., 1936, 48, 638-642.

A Self-Calibrating Time-Control for Multiple Circuits. Amer. J. Psychol., 1937, 49, 109-113. (with N. Powell).

Some Implications of Recent Psychology. Phi Kappa Phi J., 1940, 139-144.

A Study of Factors Determining Accuracy of Tracking by Means of Handwheel Control. Report No. 3451, Office of Scientific Research and Development, Washington, D. C. 1942. (with W. H. Howe).

A Supplemental Study of Factors Determining Accuracy of Tracking by Means of Handwheel Control. Report No. 3452, Office of Scientific Research and Development, Washington, D. C. 1942. (with W. H. Howe).

Handwheel Speed and Accuracy of Tracking. Report No. 3453, Office of Scientific Research and Development, Washington, D. C. 1942. (with W. H. Howe).

Inertia, Friction, and Diameter in Handwheel Tracking. Report No. 3454, Office of Scientific Research and Development, Washington, D. C. 1942. (with W. H. Howe).

Relative Accuracy of Handwheel Tracking with One and Both Hands. Report No. 3455, Office of Scientific Research and Development, Washington, D. C. 1942. (with W. H. Howe).

Tracking with Illuminated and Non-Illuminated Oscilloscopes. Report No. 3608, Office of Scientific Research and Development, Washington, D. C. 1942. (with W. H. Howe).

Thinking: Some Problems and Solutions. Bull. Wagner Free Inst. Sci., 1943, 18, 9-18.

Psychological Aspects of Some Post-War Problems. Bull. Wagner Free Inst. Sci., 1945, 20, 5-15.

Some Common Features of Concrete and Abstract Thinking. Amer. J. Psychol., 1946, 59, 468-472. (with H. B. Helson).

Adaptation-Level as Frame of Reference for Prediction of Psychophysical Data. Amer. J. Psychol., 1947, 60, 1-29.

Adaptation-Level as a Basis for a Quantitative Theory of Frames of Reference. Psychol. Rev., 1948, 55, 297-313.

Design of Equipment and Optimal Human Operation. Amer. J. Psychol., 1949, 62, 473-497.

Perception and Personality--A Critique of Recent Experimental Literature. USAF Sch. Aviat. Med. Rep., No. 1, 1953.

A Quantitative Theory of Time-Order Effects. Amer. J. Psychol., 1954, 67, 327-334. (with W. C. Michels).

A Reconciliation of the Veg Scale with Fechner's Law. Amer. J. Psychol., 1954, 67, 677-683. (with W. C. Michels).

An Experimental Approach to Personality. Psychiat. res. Rep., 1955, 2, 89-99.

Un Planteamiento Experimental del Estudio de la Personalidad. Rev. Psicol., (Madrid), 1955, 10, 15-24.

A Short Method for Calculating the Adaptation-Level for Absolute and Comparative Rating Judgments. Amer. J. Psychol., 1955, 68, 631-637. (with P. Himelstein).

Attitudes as Adjustments to Stimulus, Background, and Residual Factors. J. abnorm. soc. Psychol., 1956, 52, 413-422. (with R. R. Blake, J. S. Mouton, and J. A. Olmstead).

Quantitative Denotations of Common Terms as a Function of Background. Amer. J. Psychol., 1956, 69, 194-208. (with R. S. Dworkin and W. C. Michels).

The Generality of Conformity Behavior as a Function of Factual Anchorage, Difficulty of Task, and Amount of Social Pressure. J. Pers., 1957, 25, 294-303. (with R. R. Blake and J. S. Mouton).

An Experimental Investigation of the Effectiveness of the "Big Lie" in Shifting Attitudes. J. Soc. Psychol., 1958, 48, 51-60. (with R. R. Blake and J. S. Mouton).

Petition-Signing as Adjustment to Situational and Personal Factors. J. soc. Psychol., 1958, 48, 3-10. (with R. R. Blake and J. S. Mouton).

Anchor, Contrast and Paradoxical Distance Effects. J. exp. Psychol., 1960, 59, 113-121. (with M. C. Nash).

On the Inhibitory Effects of a Second Stimulus Following the Primary Stimulus to React. J. exp. Psychol., 1962, 64, 201-205. (with J. A. Steger).

The Influence of Context Upon the Estimation of Number. Amer. J. Psychol., 1963, 76, 464-469. (with W. Bevan and R. A. Maier).

Reflections of the Retiring Editor. Psychol. Bull., 1964, 62, 427-428.

Competing Theories of Receptor Excitation in the Retina: A Symposium. Psychol. Bull., 1964, 61, 241.

An Investigation of Variables in Judgments of Relative Areas. J. exp. Psychol., 1964, 67, 335-341. (with W. Bevan).

Review of: E. G. Boring: History, Psychology, and Sciences: Selected Papers. New York: Wiley, 1963. Southwestern Social Science Quarterly, 1965.

Torque: A New Dimension of Tactile-Kinesthetic Sensitivity. Amer. J. Psychol., 1965, 78, 271-277. (with B. Woodruff).

A Quantitative Study of Relevance in the Formation of Adaptation Levels. Perceptual and Motor Skills, 1966, 22, 743-749. (with W. Bevan and H. G. Masters).

A Study of Inflection Points in the Locus of Adaptation Levels as a Function of Anchor Stimuli. Amer. J. Psychol., 1966, 79, 400-408. (with H. G. Masters).

Anchor Effects in Pitch Localization. Amer. J. Psychol., 1966, 79, 458-463. (with E. D. Rubin and M. E. Ware).

The Two-Point Threshold as a Function of Position in the Dermatome. J. comp. phys. Psychol., 1966, 62, 314-316. (with C. K. Adams).

Some Problems in Motivation from the Point of View of the Theory of Adaptation Level. Nebraska Symposium on Motivation 1966, Lincoln, Nebraska: University of Nebraska Press, 1966, 137-182. (D. Levine,

Editor).

Some Remarks on Gestalt Psychology by Kurt Hoffka. Journal of the History of the Behavioral Sciences, 1967, 3, 43-46.

Stimulus Generalization as a Function of Contextual Stimuli. J. exp. Psychol., 1967, 73, 565-567. (with L. Avant).

Torque sensitivity as a function of Knob Radius and Load. Amer. J. Psychol., 1967, 80, 558-571. (with B. Woodruff).

Anchor Effects Using Numerical Estimates of Simple Dot Patterns. Perc. and Psychophys., 1968, 4, 163-164. (with Aiko Kozaki).

Effects of Duration of Series and Anchor Stimuli on Judgments of Perceived Size. Amer. J. Psychol., In Press, 1968. (with T. Kozaki).

A Study of Visual Temporal Size Contrast. Perc. and Psychophys., In Press, 1968. (with T. Kozaki).

A Salute to J. P. Guilford. In Press.

Response to Professor McFarland's paper, Conference on Aging, Morgantown, W. Va. In Press.

REPORT OF THE PRESIDENT, FRED W. BILLMEYER, JR.

In my first year as President of the ISCC, I have taken the opportunity to reflect on several aspects of the Aims and Purposes of the Council as stated in our By-Laws. Perhaps, in view of this and of discussions I have had with our Officers, Directors, Delegates, and Individual Members, it may not be out of place for me to remind you that we are a council of societies organized "to stimulate and coordinate the work being done by various societies, organizations and associations leading to the standardization, description and specification of color by these various societies, organizations and associations, and to promote the practical application of results to the color problems arising in science, art, and industry."

Several comments come to mind. First, we are a group of societies, and we speak officially to and for them, not to or for individual members. More about the merits and implications of this later. Second, our Member-Bodies range broadly in interest and include many who are not primarily interested in science, but rather in art and industry--and, I might add, in design, fashion, the market place, and related areas. If we are to serve them as well, we must become, or convince them that we are, interested in many aspects of color other than the scientific.

To implement the aims and purposes of the Council, in

this and other respects, your Board of Directors and I have undertaken four new efforts at better liaison between the Council and its administration, on the one hand, and our Member-Bodies, Delegates, Individual Members, and the whole group of persons interested in color, on the other. Separate reports of three of these efforts appear elsewhere in this issue, so I shall not go into full detail here. The four are:

1. Establishment of a Color Information Bureau under the direction of the immediate past-president, currently Warren L. Rhodes. The purpose of the Bureau is to coordinate the gathering and dissemination of information, advice, and assistance (at times material) on any aspect of color at whatever point it is needed. The Bureau has the status of a standing committee of the Council, like the Problems Committee, and it will operate through groups oriented towards specific objectives, much like the Problems Subcommittees. Mr. Rhodes' separate report gives more detail.

2. Improved liaison with Member-Bodies through their Delegations, by the appointment of the vice-president (currently Randall M. Hanes) as Officer responsible for Member-Body liaison. Dr. Hanes has prepared a separate report in this issue, describing recent contacts with several of the Delegations and the objectives of this new office.

In addition to this effort, I have recently taken the opportunity of talking with a majority of Delegation Chairmen in connection with the required annual report of each Delegation to the Council. This has been a fruitful and enjoyable experience for me, but it has suggested to me the advisability of reminding the Delegations of their responsibilities to the Council as outlined in the By-Laws essentially as follows but with considerable paraphrasing:

The Delegation Chairman shall: report to his Member-Body all proceedings of the Council of interest to the Member-Body, including any Council reports that should appear in the Member-Body publications; bring to the attention of the Council any problems in the field of color of particular interest to the Member-Body (both scientific and non-scientific problems to the Problems Committee, other requests for information or material assistance to the Color Information Bureau--F.W.B.); keep the closest possible relations between the Council and the Member-Body by holding at least one meeting of his Delegation per year; and report to the Council Secretary in writing and, optionally, orally once a year at the time of the Annual Meeting. (It is customary to append to this annual report a list of publications on color from the Member-Body publications--F.W.B.)

In addition, the Council depends heavily on the Delegations and their Chairmen as a source of information for News Letter items. Since we exist largely for the benefit of the Member-Bodies, it is essential that we report to our membership what each of them is doing.

We expect to supplement this source of news by closer liaison on our part with the designated information officer of each Member-Body, hoping in this way to obtain more prompt and complete information on routine matters such as dates of meetings. We also plan to encourage more actively joint meetings, with the suggested format of a session or symposium with speakers furnished by the Council, at a regular meeting of the Member-Body.

3. Improved liaison with the Individual Member Group by appointment of a Director responsible for Individual-Member Liaison, currently W. N. Hale. Mr. Hale has prepared a separate report on this subject. At this point, I wish only to quote a sentence from the By-Laws:

". . . the ultimate general authority and responsibility for the policies and affairs of the Council shall be vested in the Member-Bodies. . . ." In other words, we are organized as a council of societies in which it is not appropriate for individual members to have the same rights and privileges as Member-Body delegates. Unless this organization were altered to the extent that the Council as we know it would no longer exist, this particular situation cannot be changed.

4. Reports of Board of Directors Activities to the membership by News Letter accounts written by the President or his designate. The first such report appeared earlier this year; in a sense this may be considered the second. It is expected that a third will appear after the September Board meeting.

Some remarks on the general well-being of the Council are in order. In 1970, the Council will suffer a number of severe losses in key personnel. The Secretary, Ralph M. Evans, will resign his position on reaching retirement age. At the same time, George B. Gardner will be unable to continue his unofficial duties because of other employment commitments. The new Secretary will face the herculean task of filling both their shoes. The Treasurer, Norman Macbeth, has asked to be relieved of his duties because of the pressure of business responsibilities. Finally, when Randall W. Hanes succeeds as President, his current position as News Letter Editor will be vacated.

To soften the blow of these losses, and to insure continuing contact between the Board of Directors and those who have contributed substantially to the growth of the Council in years past, the President has asked several such persons, including some named above, to accept positions as ex-officio members of the President's Advisory Committee. (It will be recalled that the By-Laws limit regular membership on this Committee to the five most recent past Presidents of the Council.) The ex-officio members will receive copies of the minutes of Board of Directors' meetings, will be encouraged to attend such meetings, and will be asked to advise the Officers and Directors in any way that may seem appropriate. Announcement of the

names of those accepting the appointment will be made at a later time.

The Finance Committee has recommended to the Board of Directors that, for the first time in at least thirty years, an increase in dues be considered, to be effective not later than 1971. Although the By-Laws state that the dues shall be determined by the Board of Directors, the Board feels that in this instance an increase should not be made without the approval of the voting Delegates and it is expected that a vote of approval will be requested at the next annual meeting. A full statement and explanation of the proposed increase will be circulated before that time.

Tentative themes for symposia at the next several annual meetings were discussed at the April 13, 1969, meeting of the Board of Directors. A symposium on some aspect of the psychology of color was suggested for 1970, and Randall M. Hanes accepted the responsibility of appointing a Symposium Chairman and a General Meeting Chairman for that meeting. Roland E. Derby, Jr., reminded the Board that 1971 is the fiftieth anniversary year of the American Association of Textile Chemists and Colorists, and suggested that aspects of textile coloring, both styling and technical, be considered as themes for the 1971 annual meeting. Preliminary consideration is also being given to a Williamsburg-type symposium on "Color Reproduction," with Warren L. Rhodes and John C. Yule as possible co-chairmen. If such a symposium were held, 1971 or early 1972, the theme of the graphic arts might be appropriate for the 1972 annual meeting.

Of more immediate interest are plans for the first international joint meeting (to the President's knowledge) of the ISCC with a counterpart in another country. Such a meeting will be held with the Colour Group (Great Britain) in London on June 16-17, 1969. Program and plans as they are now known are publicized elsewhere in this issue of the News Letter, and all Council members in Europe following the AIC Stockholm meeting are urged to attend.

NEW MEMBERS

The following applications for individual membership were accepted at the last meeting of the Board of Directors, held in New York City on April 13, 1969.

Mr. Raymond B. Andersen
Stroblite Co. Inc.
75 West 45th Street
New York, New York 10036

Interests: Applications of fluorescence, and "Sunday Painter" (water colors and oils).

Mr. William D. Bowdler
406 Beebe Avenue
Elyria, Ohio 44035

Interests: Measurement and control of production in

cadmium lithopone pigments.

Mr. Edwin J. Breneman
Macbeth Corporation
P.O. Box 950
Newburgh, New York 12550

Interests: Research on color perception in complex fields, under various conditions of adaptation; color appearance measurements and scaling; photographic color reproduction; and color rendering.

Mr. Alvin Byer
3004 Runnymede Dr.
Norristown, Pa. 19403

Interests: Color perception, color measurement.

Mr. Sidney Cookson
1314 Cheshire St.
Cheshire, Conn. 06410

Interests: Color matching, color control visual and instrument.

Mrs. Rose Halbrook
1165 Morningside Avenue
South San Francisco, Calif. 94080

Interests: Scientific Color Systems--A Unified Order for Educational Purposes.

Mr. Henry G. Hollingsworth
Ciba Chemical & Dye Company
P.O. Box 1988

Charlotte, North Carolina 28201
Interests: Spectrophotometric measurement and Computer Shade Matching of Textiles.

Mr. C. F. Matthews
Xerox
Xerox Square, Bldg. 129
Rochester, New York 14603

Interests: Specification and control in industrial applications.

Mrs. Olga Menaker
1199 Park Avenue
New York, New York 10028

Interests: As a practicing decorator, dealing with diverse elements of color in fabrics, paints, etc. As a teacher, teaching professional students color mixing and color combinations. Also conducts a Decorating Workshop with emphasis on color effects.

Mr. Charles B. Rubinstein
Bell Telephone Laboratories
Holmdel, New Jersey 07733

Interests: Research in the field of perceived color from a psycho-physical point of view and colorimetric investigations pertaining to colored displays, e.g., color TV.

Mr. Emil B. Terilli
3750 Hudson Manor Terrace
Riverdale, New York 10463

Interests: Graphic illustrations of color harmonies and combinations and reproduction of same in an orderly, simplified manner toward objective of enhancing use of color by all interested in color such as artists, teachers and students, printers, decorators.

Mr. C. J. Walton
Alcoa Research Laboratories
P.O. Box 772
New Kensington, Pa. 15068

Interests: Research in development of colored finishes for aluminum products, and use of instrumentation to measure color and to follow changes in surface appearance.

Mr. Benno Weber
Ford Motor Company
Chemical Products
Mount Clemens, Michigan 48043

Interests: Color development and research.

Putnam Growth Fund-- 186.416 shares (market value--\$2,427.14)	1,727.87	3,864.47
Other receivables		<u>592.02</u>
Total		<u>\$19,542.56</u>

LIABILITIES

Accrued liabilities		\$ 1,470.40
Surplus:		
Balance, January 1, 1968	\$23,033.18	
Deduct: Excess of expenses over income for the year-- Exhibit B	4,961.02	<u>18,072.16</u>
Total		<u>\$19,542.56</u>

STATEMENT OF INCOME AND EXPENSES

(Unaudited)

FOR THE YEAR ENDED DECEMBER 31, 1968

Income:			
Dues:			
558 individual members*			
29 member bodies			\$ 4,289.00
Publication sales:			
Newsletter	\$ 164.27		
Bibliography	58.15		
Royalties	346.69		569.11
Interest and dividends:			
Affiliated Fund, Inc.	74.25		
Bowery Savings Bank	433.39		
New York Savings Bank	294.79		
Greenwich Savings Bank	58.06		860.49
Other income:			
Annual Meeting:			
Reservations & registrations	\$3,182.00		
Cost of dinner & expenses	5,198.95	(2,016.95)	
Miscellaneous		2.59	(2,014.36)
Total income			3,704.24
Expenses:			
President's office	56.60		
Treasurer's office	49.90		
Secretary's office	303.57		
Newsletter	2,976.86		
Special publications	584.19		
Contingency fund	4,694.14		
Total expenses			<u>8,665.26</u>

REPORT OF THE SECRETARY, RALPH M. EVANS

During the year the membership list was reprinted and sent to the membership. The reprints from the Williamsburg Technical Conference on Instrumental Approaches to Colorant Formulation, held in 1966, have now been distributed to the membership, and extra copies of the set are available at a nominal charge from Rochester Institute of Technology. Ordering information is on page 49 of the membership list.

The Council is now composed of 558 individual members and 31 Member-Bodies. The names and interests of the individual members accepted during the year have appeared in the News Letter which followed the meeting of the Board of Directors at which they were approved.

REPORT OF THE TREASURER, NORMAN MACBETH

BALANCE SHEET

(Unaudited)

DECEMBER 31, 1968

ASSETS

Cash:			
County National Bank	\$ 260.34		
Bowery Savings Bank	8,940.51		
New York Savings Bank	5,068.91		
Greenwich Savings Bank	816.31	\$15,086.07	

Investments, at cost:
Affiliated Fund, Inc.--305
shares (market value--
\$2,818.20)

2,136.60

Excess of expenses
over income \$ 4,961.02

*Including four honorary members at no charge.

ANALYSIS OF BUDGET

(Unaudited)

FOR THE YEAR ENDED DECEMBER 31, 1968

	<u>Expenses</u>		Under or (Over) Budget
	<u>Budget</u>	<u>Actual</u>	
President's office	\$ 500.00	\$ 56.60	\$ 443.40
Treasurer's office	150.00	49.90	100.10
Secretary's office	300.00	303.57	(3.57)
Newsletter	2,500.00	2,976.86	(476.86)
Special publications	1,500.00	584.19	915.81
Annual meeting	1,500.00	2,016.95	(516.95)
Contingency fund	2,947.00	4,694.14	(1,747.14)
	<u>\$9,397.00</u>	<u>\$10,682.21</u>	<u>\$(1,285.21)</u>

I. H. GODLOVE AWARD FUND

STATEMENT OF RECEIPTS AND DISBURSEMENTS

(Unaudited)

FOR THE YEAR ENDED DECEMBER 31, 1968

Balance, January 1, 1968:			
Cash on deposit	\$187.44		
U.S. Treasury bond, 2-1/2%, maturing 9/15/72, at cost	865.53	\$1,052.97	
Receipts:			
Interest, U.S. Treasury bond		25.00	
Balance, December 31, 1968		<u>\$1,077.97</u>	
Balance, December 31, 1968 consists of:			
Cash on deposit	\$212.44		
U.S. Treasury bond, 2-1/2%, maturing 9/15/72, at cost, market value 12/31/68, \$892.40	865.53	<u>\$1,077.97</u>	

REPORT OF THE FINANCE COMMITTEE,
NORMAN MACBETH, CHAIRMAN

The Finance Committee has studied the Treasurer's report for the calendar year, 1968, which indicates that total expenses for the Inter-Society Color Council, including the annual meeting, were \$13,864.21. The total income, including registrations from the annual meeting, amounted to \$8,903.19, thus the Inter-Society

Color Council sustained a loss of \$4,961.02 during 1968, whereas the budget had anticipated a loss of approximately \$3,400.

The areas of variation occur primarily in the following categories: annual meeting, printing of membership list, and new stationery for the Inter-Society Color Council.

Once again, the Finance Committee has reviewed the indicated income and expenses for 1969 and recommends to the Board of Directors of Inter-Society Color Council the following budget:

ESTIMATED INCOME

Membership Dues:	
A. Individual Members	\$3,402.
B. Member Bodies	1,015.
C. News Letter Subscriptions	156.
Detroit Color Council	100.
Royalty Income	350.
Other Income on Savings & Dividends	<u>750.</u>
TOTAL ESTIMATED INCOME	\$5,773.

ESTIMATED EXPENSES

President's Office	\$ 620.
Secretary's Office	500.
Treasurer's Office	150.
Annual Meeting (Excess of Expenses over Income)	500.
Williamsburg Conference (Excess of Expenses over Income)	390.
News Letter	2,500.
Publication Expense	500.
Permanent Binding of News Letters	160.
Contingency Fund	<u>453.</u>
TOTAL ESTIMATED EXPENSES	\$5,773.

As noted above, it is anticipated that the Income and Expenses for 1969 will be approximately equal. The Finance Committee requests the approval of the Board of Directors of this budget and further requests the approval of the voting delegates attending the 1969 annual meeting.

COLOR INFORMATION BUREAU

The Officers and Board of ISCC established the Color Information Bureau this year to assist authors, speakers, students, teachers, and others, who need guidance and assistance in color. The formation of the Bureau was announced in ISCC News Letter No. 198, January-February 1969. The scope and purpose were discussed, and tentative groups identified.

Many ISCC members have responded to the Chairman's request for participation. Later this year the News Letter will report on groups which have been formed and their chairmen.

The Board recommended that the primary function of the Speaker Group be to work with member-bodies in developing color symposia for their meetings.

W. L. Rhodes

REPORT OF THE NEWS LETTER EDITOR

While the issues of the N.L., in themselves, constitute a written report of the editor's activities, I want to take this opportunity to thank all those who have helped in supplying materials. In particular, Dorothy Nickerson, W. J. Kiernan, and Don Hill have been especially diligent.

REPORT OF THE OFFICER FOR MEMBER-BODY LIAISON, R. M. HANES

In a continuing effort to stimulate and coordinate the work being done by the diverse groups that constitute the ISCC, the Board of Directors frequently discusses ways of maintaining active interest and participation by all the Member-Bodies. As a result of discussion at the Board meeting on Feb. 11, 1969, it was decided that a more formal arrangement than heretofore is desirable for Member-Body liaison and that such liaison will henceforth be the responsibility of the vice-president of the Council.

On March 5 a letter of notification was sent to each chairman of a Member-Body delegation, with a request for suggestions about any ISCC actions and activities that would benefit both the Member-Body and the Council. Seven chairmen have replied by letter to this request. Two of the letters contained suggestions; the other five indicated that the request had been passed along to other delegates or to other interested individuals. To date, replies have been received from four individuals other than delegation chairmen. All replies were discussed at the Board meeting on April 3, 1969. Following is a summary of the suggestions received and the Board recommendations for action.

Suggestions concerning technical problems: these were referred to the chairman of the Problems Committee.

Suggestions concerning ISCC Annual Meeting:

1. That each year one Member-Body serve as host--to greet members, talk with visitors, etc.

This matter was referred to the new Information Bureau.

2. That each year three or four Member-Bodies each

be responsible for a section of the Forum, providing a top speaker or program.

This matter was also referred to the Information Bureau.

3. That program details for each annual meeting be made available by Dec. 1 of the preceding year.

The Board felt that program details should be made available as early as possible but that the Dec. 1 deadline could not be met.

Suggestions about publications:

1. That ISCC publish a periodic forecast of color trends.

As the Board understood this suggestion, it felt that such information is readily available.

2. That a newsletter, journal, or bibliography of recent developments be published once or twice a year.

It was thought that this recommendation could be partially fulfilled by reprinting for ISCC members the articles on color vision from the Annual Review of Psychology.

3. That there be an annual sales review of colors.

The Board felt that this activity is already handled well by the Color Marketing Group.

Suggestions concerning joint seminars and symposia by Member-Bodies and ISCC:

These suggestions were referred to the Information Bureau.

Suggestions concerning Member-Body activities.

1. That delegations be required to submit annual reports.

The By-Laws require at least one meeting a year by each delegation, with a report of such meetings to be filed with the Secretary (of ISCC) and published with the minutes of the Annual Meeting.

2. That one person for each Member-Body be charged with advising all members of that body about the Annual Meeting of ISCC.

This is the duty of the Delegation Chairman, as specified in the By-Laws.

3. That problem committee meetings be revitalized by asking Member-Bodies to submit new problems.

The Board felt that the New Problems sessions at the Annual Meetings should serve as sufficient incentive.

4. That Delegation Chairmen should meet as a group, almost the way Problem Subcommittees meet.

The Board thought that this might well be done at the sessions for new problems.

5. That Chairmen of the Delegations should maintain closer rapport with their members, holding working sessions or luncheon meetings at the annual meetings of their respective societies for the purpose of persuading delegates to take their duties, as outlined in the By-Laws of the ISCC, in a serious and responsible vein.

The Board concurred.

6. That Chairmen of the Delegations should take the initiative in eliminating unproductive delegates, and rotating memberships.

The Board concurred.

7. That one delegate in each Member-Body Delegation be assigned the position of publicity representative with the responsibility of feeding newsworthy items on color developments in his society to the ISCC, and likewise abstracting pertinent News Letter items for reprinting in his own society's journals.

The Board concurred.

Suggestion that the Individual Member Group be organized so that they may share in responsibilities and specific assignments, with a leader for the Group appointed by the President.

This activity has been initiated by the appointment of a Board Member responsible for liaison with the individual members.

Suggestion that a paper be given before ISCC, providing the latest thinking and concepts of IERI-IES in applying color to the illuminated environment and based on the work of Professor Harry Helson.

This suggestion was felt to fit in very nicely with plans for the 1970 Annual Meeting.

Comments about the above suggestions and Board recommendations, as well as further suggestions, will be welcome. Please address correspondence to:

R. M. Hanes
Applied Physics Laboratory
Johns Hopkins University
8621 Georgia Avenue
Silver Spring, Maryland 20910

REPORT OF W. N. HALE, BOARD MEMBER FOR LIAISON WITH INDIVIDUAL MEMBERS

In my capacity as Board Member for Liaison with Individual Members, I was available for discussion on the morning of April 14th at the annual meeting, but no one came to offer a complaint or suggestion. However, after the business session, several people talked with me and brought up the following points:

1. It is felt that Individual Members, as a group, should have some say, and vote, in the functioning of the Council. Some feel that there should be no restrictions or limitations that would separate Individual Members from Member-Body Delegates.

2. It is suggested that consideration be given to changing the By-Laws, if necessary, to give Individual Members an effective voice.

3. In response to the statement that interested Individual Members usually find that one of the Member-Bodies has interests similar to their own, join it, and soon are on that organization's delegation, it was pointed out that many delegations are filled, that many of the delegates are not active, and that some people are on more than one delegation.

4. It was suggested that the Individual Members, as a group, be formally made a Member-Body, with possibly two delegations: one concerned with Design and Production interests, the other with Research and Development interests.

These recommendations will be submitted to the Board for consideration.

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Ed. note: See the President's Report earlier in this issue of the N.L., for discussion related to these matters.

REPORT OF THE MEMBERSHIP COMMITTEE, WALTER C. GRANVILLE, CHAIRMAN

The membership committee continues to examine suggestions for potential Member-Bodies and solicits such suggestions from members and delegates.

While no new groups have joined the ISCC in the past year, several have been considered and one is expected to join in the near future.

REPORT OF THE PROBLEMS COMMITTEE, ROLAND E. DERBY, JR., CHAIRMAN

Following are reports of the Problems Sub-Committees given at the Annual Meeting of the Inter-Society Color Council on April 15, 1969.

Problem 7--Survey of Color Specifications

Robert F. Hoban, Chairman

A brief review of the scope of this problem was given to the 19 persons in attendance, namely the revision of the 1956 publication of the report of this committee, "A Survey of American Color Specifications."

Through the past few years several lists have been prepared, each representing changes made from the meetings or from member circulations. It was an unending job of recompiling lists. It was decided to put all of these standards on punched cards so that additions could be readily made and from them, corrected, sorted lists prepared.

It was suggested that a subcommittee be formed of representatives of the societies covering the various user industries--paint, paper, plastics, etc., and organizations like the ASTM--to more authoritatively cover the various sections of standards they know about, and to solicit help from others in fields not covered by our present members. Such a subcommittee was formed.

As soon as all of the new suggested changes have been made, new lists (alphabetically, by use and by issuing organizations), will be made up and copies will be sent to all working members for corrections. After the comments and changes have been received and considered, the subcommittee plans to meet again in the fall.

Problem 14--The Colorimetry of Transparent Materials

Wesley B. Reed, Chairman

On Monday, April 14, 1969, some members of the subcommittee met with Dr. Derby to discuss what can be done to achieve publication of the Problem 14 report with the least further delay and least expense to ISCC. It was suggested that a condensed version would be palatable to the editors of the Journal of the Federation of Societies for Paint Technology. Miss Johnston bravely volunteered to undertake this condensation. It is my understanding that Dr. Derby will present this condensed version to the ISCC Board for consideration.

If this procedure is acceptable, it will make the important data available to potential users and indicate where to obtain more details if desired.

Problem 16--Standard Methods for Mounting Textile Samples for Colorimetric Measurements

Due to a change in responsibilities, W. L. Matthews has found it necessary to resign as Chairman of this sub-committee.

During the past year he directed the publication of the interim report of Methods of Mounting Textile Samples. This was published in the American Dyestuff Reporter.

It is hoped to provide reprints for members of the ISCC in the near future.

This committee will continue to assemble additional methods, as they become available.

Problem 18--Colorimetry of Fluorescent Materials

Franc Grum, Chairman

At the April 14, 1969 meeting on this problem, the committee discussed the latest interlaboratory measurements of samples containing fluorescent whitening agents. Included were plastic, fabric and paper samples as well as fluorescent printing inks. Five different spectrophotometers from four different countries were used to measure spectral radiance factor of these samples. Colorimetric parameters were calculated from the spectrophotometric measurements and were also determined with three types of filter colorimeters which were also involved in the tests. The results are encouraging and it was decided that there is no need for another interlaboratory test. However, it was decided to make some visual appraisals of the materials used in the last test and examine the correlation of visual appraisal and measured data. A task force (4) was formed to conduct visual examination of the samples under prescribed conditions. As a result of discussions it was decided that the Problem 18 committee should cooperate closely with the CIE committee that is concerned with proposing a suitable formula for specification of whitening of materials containing fluorescent whitening agents.

Problem 21--Standard Practice for Visual Examination of Small Color Differences

Sam Huey, Chairman

The comments, corrections and additions that were suggested by the various problem committee members were discussed at the April, 1969 meeting of Problem 21.

All those present expressed a desire to see the report published as soon as possible. One committee member stated that certain parts of the report were already being used by Industry.

By a vote of the group present, the Chairman was instructed to make the necessary changes in the report and resubmit it to the ISCC Problems Committee.

Problem 24--Color Measuring Instruments: A Guide to their Selection

Ruth M. Johnston, Chairman

Forty interested persons attended the Monday morning meeting of the Subcommittee and offered constructive criticism of the third revision of the report. The first change agreed upon was the selection of a new title for the report. It was agreed that the title used above was more representative of the purpose of the Subcommittee's activities.

A history and progress report of the Subcommittee's work was presented to the general membership as the Introductory Remarks for the Tuesday afternoon's Symposium on "Color Measuring Instruments 1969." The text of these remarks follows.

It was originally proposed that the Subcommittee prepare a "simple but complete catalog of color measuring instruments." In order to accomplish this we first prepared a letter to be sent to instrument manufacturers advising them of our purpose. We enclosed a questionnaire which we asked them to use as a guide in sending us information about their instruments. As usual, some responded, some didn't. We then asked individual members of the Subcommittee to take various parts of the accumulated information and put it into tabular form, to prepare brief editorial comment necessary to describe the major characteristics of the instrument, and to include an annotated bibliography relating to the performance of the instruments for which they agreed to be responsible. It was not the purpose of the Subcommittee to undertake comparative testing of instruments, but only to include published data on performance. As usual some members of the Subcommittee responded, some didn't.

It became apparent to many members of the Subcommittee that a simple catalog of color measuring instruments was not the basic need, although it was an important part of the basic need. The Subcommittee members realized, as they began to tabulate instrument characteristics that, for the neophytes, the characteristics would not mean very much to them if they didn't know what characteristics were important to them in selecting an instrument to solve their specific problems. It was also apparent to the Subcommittee that many people do not know what their problem or problems really are; and if they do not know this they cannot choose the appropriate instrumentation even if they have a catalog of instruments describing basic design characteristics.

So the members of the Subcommittee directed their attention to the preparation of a guide for the selection of the most appropriate instrumentation for use in solving a defined problem or set of problems. Out of this expanded purpose grew an enlarged scope and the new title. The preparation of the catalog then became subordinate but an important part of the preparation of the guide.

The guide will consist basically of three major sections in addition to our introduction: the first comprising a brief description of basic instrument design characteristics and a discussion of their importance in color measurement; the second devoted to a discussion of a logical scheme for analyzing the nature and extent of the problems; and the third that of putting these two aspects together in order that a carefully considered choice of instrument to meet the defined objective can be made. This latter part contains the catalog of color measuring instruments. I would like to describe briefly

in outline the contents of each of these sections in order that comment from the overall ISCC membership can be invited.

In the introduction, we have defined first the limitations which we have established for our first report: It is recognized that there are many problems associated with the study of color and colored materials. It is not the purpose of this catalog to describe all of the instrumentation available which may be useful in studying all aspects of the problems. Only those instruments from which measurements can be obtained which are translatable into a standard CIE or a CIE derived color description will be included. Thus densitometers which can be useful for measuring ink film thickness, Duboscq-type colorimeters useful for chemical analysis, and chemical colorimeters useful also for analysis of colored solutions, will not be included. Radiometers which are used to measure the color of luminous bodies will be included separately at a later date. In general, only instruments used for reflectance measurements in addition to transmittance measurements, generally, will be included.

The work of the committee has further been divided in order to get a portion of the work published as soon as possible. Only photoelectric instruments will be included initially--those using a visual null indication will be added later. Data reduction devices appropriate to the photoelectric instruments will be included in this first part. And the first report will include only those instruments manufactured in the United States or sold and serviced in the United States. Foreign instruments will be added as soon as possible. Instruments which are designed for special applications only will also be added in a later section. Instruments designed for special usage techniques will also be included later.

There is one point which I wish to emphasize here in this summary which is also emphasized in the introductory material of the Subcommittee's report:

The title of this Subcommittee report is somewhat misleading in its implication that instruments "measure" color--in ordinary usage we speak of color measurement, but, in reality, we do not "measure" color with an instrument. Instead we "describe" color in idealized standardized terms, derived from a measurement of the light absorption or emission of a body. "Color is what we see," and in the case of objects is "the result of the physical modification of light by colorants as observed by the human eye and interpreted in the brain." (1) It is seldom that the idealized conditions used for color description exist exactly in the real world of visual color evaluation and it is important to remember this. In general, color measurement is used to provide numbers which can be correlated with visual evaluations, and the degree to which this can be accomplished depends on both measurement and visual evaluation conditions. We do not wish to imply that "color measurement" is not a very powerful

tool. It is indeed when properly used. So we will continue to use the term "color measurement" because of its general acceptance, keeping in mind that we actually mean a subjective description based on an objective physical measurement. We add further warnings that the science of colorimetry does not account for the perceptual effects present in a complex viewing situation. Factors such as adaptation, the surrounding elements in the viewing situation, etc., affect what we see in a given circumstance. We point out that the characteristics of the appearance of materials other than color affect both what we as observers see as the color and what instruments record as the physical description of a color. The degree to which these factors of sample characteristics are important to the determination of the correlation between physical measurements and the visual evaluations is the recurring theme in the report.

The next section, a discussion of basic design features of color measuring instruments, also contains some words of warning, the principal one being the admonition that there is no such thing as an absolute color measurement of color. The color measurement values are dependent on the design of the instrument used to obtain them and on the computational procedure used in reducing the physical measurement to psychophysical or colorimetric terms. Thus there is no "absolute" in either strictly psychological, psychophysiological, nor physical terms.

Now after all of these warnings about the limitations, what is included? The second section includes a discussion of the importance of basic instrument design characteristics. Let me just enumerate these:

- (1) Optical Configuration--Is the sample illuminated by total light from the lamp and then analyzed or is it illuminated by monochromatic (or filtered light) for isolation of spectral regions first. If the samples fluoresce this can be an extremely important aspect of design.
- (2) Geometry of illumination and viewing for both reflectance measurements and for transmittance measurements.
- (3) Photodetectors--Do they have sufficient sensitivity for the measurement task at hand?
- (4) Light sources and illuminants--Their distinction and importance.
- (5) Wavelength and photometric accuracy.
- (6) Extent of polarization present in the instrument.
- (7) Extent of stray light under conditions of measurement desired, not just manufacturer's ideal description.
- (8) Speed of Operation.

- (9) Form of data output and data reduction.
- (10) Accessories.
- (11) Importance of "computation resolution."
- (12) The importance of the operator, of the condition of calibration of the instrument, and of the intelligence of the interpretation of the results.
- (13) Correlation of price with (a) precision and repeatability and (b) with convenience features.

The next section is written as an aid in defining the problems explicitly. To aid in this a check list has been set up, whereby, if the reader honestly answers the questions, the true nature of the problem can be defined. For example if the reader checks all the boxes on the right side, he has problems of processing, organization, and interpretation for which color measurement itself can supply no solutions.

A second check list is included to aid the reader in defining the exact nature of the sample or samples which he wishes to measure.

By use of the catalog in the final portion listing all of the design characteristics and types of measurement possible with various instruments the reader then fills out the third check list which puts together the contents of check lists 1 and 2 with the contents contained in the catalog and arrives at a carefully considered best solution or best compromise solution for all of the problems defined.

This has been several years in gelling. We hope to have a report in the Board's hands by Fall. We plan that this will be a continuing effort, adding new types of instruments, up-dating present instruments, and creating a valuable bibliography to papers published describing the performance of the various instruments.

Problem 27--Metamerism Index

I. Nimeroff, Chairman

The meeting of this sub-committee was primarily concerned with the future work of this sub-committee. It has been suggested at a meeting of the ISCC Board of Directors that due to the intensive work being carried on by CIE on Metamerism indices that this sub-committee should be maintained on a standby basis.

Mr. Nimeroff, the present Chairman, had indicated originally in accepting the position that he would only be able to serve for three years. Following this timetable, he has found it necessary to resign his Chairmanship. He has, however, offered to continue work with the committee if it is decided to continue on an active basis.

Mr. Nimeroff strongly urges that the sub-committee be continued, since he feels that there is considerable

progress that can be made outside of the work being carried on by the CIE.

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

Subcommittee 30 continues its progress in securing acceptance of the Munsell notation as the basic color language. Members reported the inclusion of the color language, along with the commercial name, on new color cards and product samples.

The Committee unanimously approved member Alex Styne's paper, "The Universal Color Language--A Working Tool for the Designer." Members of the Committee have offered to promote the publication of the paper in various media including "in-house" papers, magazines and newspapers.

The Committee urges the I.S.C.C. to take further action on the previously requested film showing the need and use of the Munsell Color Language. Dorothy Nickerson, and Deane Judd, Members of the Committee, met and formed a proposal to the A.I.A. encouraging the acceptance of the Color Language by the Architects. It has been stated that they are the key to general acceptance of the Color Language by the building industry.

Because of the great interest in the Committee, many members offered to meet in the fall for a work session. Members signed up for two further projects of the Committee, surface finishes and suggested tolerances. Research in these areas will be conducted by Committee individuals for report at the next meeting.

REPORT OF THE AMERICAN ARTISTS
PROFESSIONAL LEAGUE DELEGATES,
FRANK C. WRIGHT, CHAIRMAN

During the past year we have seen many new manifestations of the value, the depth and the breadth of the Inter-Society Color Council.

We attended the meeting at Williamsburg with great enjoyment and considered it very rewarding, both as to the papers given and the discussions. Dr. Robert Feller's papers have been reported in the News Letter previously. He is Chairman of our Technical Committee.

During the past year we are increasingly interested in the relationship of applied technical innovation as against originalities of artistic invention and expression.

Some of our members are far advanced in combining sculpture, painting, computer and tape control of animated figures dressed in historically authenticated period costumes with a myriad of sound effects. The effect is breath-taking in its realistic impact, and is a

genuine creative marriage between technology and fine art.

REPORT OF THE AMERICAN INSTITUTE OF
ARCHITECTS DELEGATES, WALDRON
FAULKNER, CHAIRMAN

The delegates from the American Institute of Architects to the Inter-Society Color Council for 1969 were as follows:

Waldron Faulkner, Chairman
Milo D. Folley
Eric Pawley
E. N. Lundberg, Jr.
Theodore W. Dominick
William H. Scheick, Executive Director.

Milo Folley has been active during the past year in urging the Institute to encourage architects to use the Munsell system as a basis for color specification. He has also urged the Institute to develop an educational film to show architects and industry the need for a common color language.

Albert O. Halse, AIA, Associate Professor of Architecture at Columbia University, published a book, The Use of Color in Interiors.

REPORT OF THE AMERICAN OIL CHEMISTS'
SOCIETY DELEGATES, W. L. ST. JOHN, CHAIRMAN

No new color problems were undertaken during the year.

The following articles were published in the Journal during the past year (through March, 1969).

Effect of Heat on Enzyme and Color of Rapeseed Oil, Tepe and Sims, JAOCS, 45, 194-6 (1968)

Performance and Appearance of Laundered Synthetic Fabrics, Hunter, JAOCS, 45, 362-6 (1968)

Optical Brighteners as Detergent Additives, Stensby, JAOCS, 45, 497-504 (1968)

Comments on Use of the Lovibond System, Chamberlin, JAOCS, 45, 711 (1968)

Computerization in Fabric Detergency Testing, Illman, Hartwig and Roddewig, JAOCS, 46, 70-4 (1969) (use of automatic reflectance colorimeter)

Use of Optical Brighteners for Synthetic Fibers in Detergents, Anliker, Hefti and Kasperl, JAOCS, 46, 75-80 (1969)

REPORT OF THE AMERICAN PSYCHOLOGICAL
ASSOCIATION DELEGATES, JO ANN S. KINNEY,
CHAIRMAN

Research on color vision continues to stem from a multi-discipline approach with inputs from physiologists, psychologists, optometrists, ophthalmologists, biochemists, physicists, etc. The data tend to be categorized as either physiological or psychological (behavioral), as evidenced in the new summary of color vision by Ripps and Weale in the Annual Review of Psychology. Although grouped under the headings "Objective" and "Subjective" (a dichotomy with which most psychologists would take issue), the results from both fields show the constant interplay which now characterizes color vision research. Behavioral and psychological data are usually discussed in terms of underlying physiological mechanisms, while the functional significance of most physiological measures is sought by trying to relate them to psychological data. The work of psychologist Russell De Valois is particularly noteworthy in this regard, since he determines both physiological and behavioral data on the same species (generally various types of monkeys) and then attempts to relate the two.

A number of psychologists are extending color vision research to behavioral studies of animals in order that these data may be correlated with physiological evidence obtainable only in animals. John Lott Brown continues to work with the cat, reporting that they have both photopic and scotopic spectral sensitivity curves.

At the University of Pennsylvania, Hurvich and Jameson also have continued research on the color vision of different species. Yager and Jameson have recently published a summary of criteria for assessing color vision in animals. The Hurviches remain active investigators of human color vision as well and are working on problems of the photochromatic interval, after-images, and increment thresholds.

A cross-discipline approach to color vision is made by Lorrin Riggs and his colleagues at Brown University on human beings by relating electrophysiological recordings to psycho-physical data. They have extended their technique of alternating different wavelengths to determine sensitivity to wavelength differences in the ERG to use with the evoked potential in the EEG.

William Biersdorf continues his interest in the ERG and in attempting to differentiate the various components that form it. His latest report shows that both rods and cones contribute to the off-effect in the ERG.

Additivity has been the subject of investigation of two of our APA delegates. At Rochester, Boynton and Kaiser have shown that additivity can hold, even in heterochromatic photometry, if the subject is instructed to adjust the bipartite field for a "minimum border" rather than attempt brightness matches. Those of you who were able to attend the ISCC Symposium on Visual

Perception at Williamsburg heard Sherman Guth's excellent presentation of his work on additivity failures in color mixtures.

At the Submarine Medical Center, we have extended our work on the visibility of colors underwater to include two different sources of artificial illumination. The most visible colors now become a complex interaction of the type of paint used (both color and fluorescent-nonfluorescent), the absorption of the particular body of water, and the distribution of energy.

A list of new publications is given below:

Biersdorf, W. R., Rod and cone contributions to the off-effect of the human ERG. *Investigative Ophthalmology*, St. Louis Vol. 7, No. 4, 371-377, 1968.

Boynton, R. M. and Kaiser, P. K., Vision: the additivity law made to work for heterochromatic photometry with bipartite fields. *Science*, 161, 366-368, 1968.

Brown, J. L., Metz, J., and Yohman, J. R., A test of scotopic suppression of the photopic process. Technical Report No. 6, Kansas State University-Office of Naval Research, Contract 3634(04), Sept. 1968.

Hurvich, L. M., Jameson, D., and Cohen, J. D., The experimental determination of unique green in the spectrum. *Perception and Psychophysics*, 4(2), 65-68, 1968.

Kaiser, P. K., Color names of very small fields varying in duration and intensity. *J. Opt. Soc. Am.*, 58, 1151-1158, 1968.

Kinney, J. A. S., Luria, S. M., and Weitzman, D. O., The underwater visibility of colors using artificial illumination. Naval Submarine Medical Center, Naval Submarine Base, Groton, Conn. Rep. No. 551, 15 Oct. 1968.

LaMotte, R. H. and Brown, J. L., An apparatus for psychophysical investigations of visual processes in semi-restrained cats. Technical Report No. 7, Kansas State University-Office of Naval Research, Contract 3634(04), Oct. 1968.

LaMotte, R. H. and Brown, J. L., Dark adaptation in the cat. Tech. Rep. No. 8, Kansas State University-Office of Naval Research, Contract 3634(04), Oct. 1968.

LaMotte, R. H. and Brown, J. L., Some problems encountered while training cats to perform a visual tracking task. Tech. Rep. No. 9, Kansas State University-Office of Naval Research, Contract 3634(04), Nov. 1968.

LaMotte, R. H. and Brown, J. L., Photopic and scotopic spectral sensitivity functions of the cat. Technical Report No. 10, Kansas State University-Office of Naval

Research, Contract 3634(04), Jan. 1969.

Riggs, L. A. and Sternheim, C. E., Human retinal and occipital potentials evoked by changes in wavelength of the stimulating light. Proceedings, 76th Annual Convention, APA, 1968. Pp 105-106.

Ripps, H. and Weale, R. A., "Color Vision" in Annual Review of Psychology (Annual Reviews, Inc., Palo Alto, Calif.) Vol. 20, 1969.

Scheibner, H. M. O. and Boynton, R. M., Residual red-green discrimination in dichromats. *J. Opt. Soc. Am.*, 58, 1151-1158, 1968.

Sternheim, C. E. and Riggs, L. A., Utilization of the Stiles-Crawford effect in the investigation of the origin of electrical responses of the human eye. *Vision Res.*, 8, 25-33, 1968.

Yager, Dean. Behavioral measures of spectral sensitivity in the goldfish following chromatic adaptation. *Vision Res.* 9(1), 179-186, 1969.

Yager, Dean and Jameson, Dorothea, On criteria for assessing type of colour vision in animals. *Animal Behaviour*, 16, 2931, 1968.

REPORT OF THE AMERICAN SOCIETY OF
PHOTOGRAMMETRY DELEGATES, JOHN
T. SMITH, CHAIRMAN

OPTICAL REQUIREMENTS FOR MAPPING LENSES AND PHOTOGRAMMETRIC INSTRUMENTS USED IN COLOR PHOTOGRAMMETRY

Introduction

For many decades photogrammetry has relied almost entirely on the use of black and white photography. If we take a look at the electromagnetic spectrum, we will find that the photographic spectrum extends from the X-ray region (about 300 nm to 950 nm). The lens used in aerial photography, however, does not admit the ultra-violet below 350 nm while the use of a minus blue filter for purposes of sharpening the image on the negative, by eliminating atmospheric haze, narrows the band still more from 500 to 950 nm.

If we consider the panchromatic emulsion used some 10 years ago, the upper cut-off was approximately at 680 nm, however, with an extended red region cut-off is now at 740. This band from 500 to 740 nm is the usual range from black and white photographs which it has been necessary to consider in the design of photogrammetric equipment.

Such requirements definitely limited the necessary corrections for aerial photogrammetric lenses and it allowed anaglyphic treatments of the optics for stereo-

scopic viewing, such that one eye observed one negative through a viewer using a red filter and the other eye used a green. Stereoscopic depth was then obtained with the observers visual train.

With the ever increasing use of color, infrared and false color infrared the situation has changed. The aerial photographer prefers not to have to select a different camera for each separate range of the spectrum. He would like to use one camera to accommodate all the selectively sensitized films. Similarly, the darkroom technician, the cartographer, and the photo-interpreter prefer to use only a few highly corrected instruments that will do the complete working task for color.

Since many of these instruments are now deficient in various ways as color is compared with black and white requirements, this means that for the photogrammetric pieces of equipment either:

- a. They require complete new redesign.
- b. They require complex modification.
- c. They require simple modification.
- d. They are satisfactory for present purposes.

The requirements for all instruments in the Optical Photogrammetrical Chain are simply stated. It is embodying these requirements in equipment that is complex and difficult.

Requirements are these:

- a. Optics must be completely correct for color application both with respect to focus and aerial color.
- b. They must be completely corrected for position-- that is, distortion must not vary with color.
- c. Resolution quality must equal or exceed that of black and white.
- d. Where automatic exposure is used, this must be corrected for the full spectral range of sunlight rated at 5,000°K or higher.
- e. Where viewing conditions are concerned, white light with the same rating must be provided.

Granted that the equipment may not ever attain perfection, it is nevertheless true that with our better understanding of color problems and new computer tools to attack, we are in a much better position each year to approach the goal.

The Photogrammetric Lens

Modern lenses, while color observations are not completely correct over this range, do approach a good

correction. Lenses such as the Universal Wild Avigon, Ziess Pleogon, the Geocon I and Geocon IV, as well as the Perkin-Elmer 6" mapping lens, which has not yet been field-tested, are doing the best work at present. Satisfactory color has been exposed in cameras equipped with the first four lenses. So have false color infrared and the infrared films themselves. This means that the photographer can simply change from one film to another knowing all films will have acceptably good definition at the focal plane. As the use of color extends further in terms of quantity--the amount of footage used relative to black and white--we can expect further improvement in quality. The optical designer and instrument engineer search further for improvements.

Photographic Filter

All functions with color photogrammetry are more critical than black and white. In controlling the illumination on the focal plane, the anti-vignetting filter, which consists of a non-uniform coating applied to the glass filter surface, is used. For black and white photography with minus blue filter, distribution of this coating for uniform image illumination is not exceptionally critical. When color is used, however, an imperfect distribution will change the color characteristics and a much more precise formula must be found.

Color Testing of the Lens or Camera

As specifications for color cameras are more rigid than those for black and white, the testing investigations increase accordingly. The Bureau of Standards in conjunction with Coast and Geodetic Survey has developed a very informative color test. William Taysman of the National Bureau of Standards used a resolution reticle so assembled that each quadrant was illuminated with a different colored light. It can be seen that resolution lines actually cross the division between the colors. This displacement of one color with respect to another color is immediately obvious and variation in distortion with color can be measured.

This test, of course, does not check out the displacement of the infrared, and it is planned that test procedures now being written by the members of the American Society of Photogrammetry Color Committee will include this feature.

In summary then, the photogrammetric camera must be fully corrected for color and radial distortion from the 350 to 950 nm range while resolution remains high, for the wide angle lens, or further improvements.

REPORT OF THE COLOR ASSOCIATION OF THE UNITED STATES DELEGATES, MIDGE WILSON, CHAIRMAN

The color rampage has passed. So great was the impact

that it touched, and changed, every facet of our life. We readily accept the fact that color dominates our environment. The significant element is not so much the extensive use of color as the degree to which every area is influenced by trend colors. Today's restless mood requires changing color patterns. The consumer is responsive to new colors just as to current musical hits and slang expressions. While "How dies that grab you?" is replacing "Sock it to me," violet and fuschia are gaining strength, superseding yellow and orange as high accent colors. Not only are trend colors applied in styling for every field, but now the industry giants are developing coordinated trend color programs for all of their divisions. Thus, color supplies a new link for industry.

The full potential of color as a tool has yet to be explored. Its impact, via TV and men's wear, is an example. For the pros, color has become part of the showmanship. In championship games it is easy to follow your favorite when his colors are distinctive.

In response to this total application of color, the Color Association has augmented its service with a new HOME FURNISHINGS COLOR CARD, planned especially for home furnishings and allied fields. Like our other services, this color forecast is developed by a committee composed of leading creators in the field. Forecast colors will be presented in yarns and paint chips, providing standards for both soft and hard surface styling. As the accelerated use of color extends to every type of product, we have received an increasing number of requests for information concerning a positive color direction and definite color trends. Not only will this new HOME FURNISHINGS COLOR CARD provide such direction, it will also give an insight into the thinking of industry leaders and an opportunity to augment color libraries.

With every phase of our existence dominated and controlled by mass production and distribution and mass application of facts, figures, and communications, we turn more and more to color for the counter-attack, for COLOR is the one element in our mass dominated existence which offers an opportunity for individual expression.

REPORT OF THE COLOR MARKETING GROUP DELEGATES, LOUIS A. GRAHAM, CHAIRMAN

In 1968, the Color Marketing group announced the formation of the Forrest L. Dimmick Award to be given to those persons who, working in the general field of color, make significant contributions towards better color marketing and particularly towards better communications among government, business, art and science activities in color.

In Spring 1968, CMG met in Cincinnati, Ohio with Miss Sharon de Leon of Formica Corporation as program chairlady. The COLORMART displays, with tabletop

exhibition space free to members, were all well received. The meeting theme, "The Name of the Game is Color For Profit," was clearly delineated by all the speakers.

The two day Fall 1968 meeting was chaired by Miss Beatrice West, whose theme "Color in Action" was presented in nine acts with 12 speakers, 4 workshops, 11 committee meetings and display of all five years of the COLORFAIR exhibit 1963-68. Jack Weinhart of Braniff told how Pucci-designed stewardess uniforms and lots of COLOR moved his airline from the red to the black, with lots of green in the till and fewer blue Mondays. Whit Hobbs, Benton & Bowles, talked of color and advertising with considerable wisdom and wit. Jose Martin, Allied Chemical, closed the session with a beautiful display of color in various forms and moods, both with slides and live models.

In Spring 1969, CMG returned to New York with a "NOW" approach to color. The invitation to attend challenged participants to consider "what are you going to have to do if you expect to compete successfully in selling to the 'under 30' market--now one half our population." The program brochure was enticingly printed in fluorescent colors under the title "COLOR IS MY BAG."

The speakers in the Spring 1969 meeting were:

Monday, March 31--Mr. Paul P. Kaufman, V. Pres., M. Lowenstein & Sons, Inc.--"The Color Revolution In Textile Design and Marketing"

Mr. Ralph Kerns, Dayglo Color Corporation--"Yesterday, Today and Tomorrow!"

Mrs. Amelia Bassin, V. Pres., Creative Director of Rayette-Faberge, Inc.--"Color Styling, Color Packaging and Color Marketing of Cosmetics"

Mr. Mill Roseman, Executive V. Pres., The Lampert Agency, Inc.--"The Use of Color in Creative Expression."

Tuesday, April 1--Mr. E. Carlton Winckler, Director of Design and Shops for the C.B.S. Television Network --"How to Use Color in Television"

Mr. William Segal, Publisher, American Fabrics Magazine, International Color Authority--"Fashion Color Trends"

REPORT OF THE DRY COLOR MANUFACTURERS' ASSOCIATION DELEGATES, RAYMOND THORNTON, CHAIRMAN

During the past year, DCMA has used the usual medium of a verbal report at its monthly meetings to keep its members generally abreast of what is happening in the field of color and color measurement and in a more

detailed way by reprinting appropriate extracts from the ISCC News Letter in its Journal "The Rainbow," which is published from time to time by Mr. E. J. Hildebrand.

DCMA continues its financial support to schools concerned with color science education, and grateful letters of appreciation are on record from Clemson University and Rensselaer Polytechnic Institute for these grants.

REPORT OF THE FEDERATION OF SOCIETIES FOR PAINT TECHNOLOGY DELEGATES, RUTH M. JOHNSTON, CHAIRMAN

During the year 1968 activities of the FSPT of interest to ISCC members include the following:

The third symposium in the series on the Fundamentals and Problems of Color was presented at the annual meeting of the Federation on Saturday morning, October 26. The program, devoted exclusively to the topic, Color Differences, was arranged by S. Leonard Davidson of National Lead Company, Hightstown, New Jersey and moderated by Max Saltzman of Allied Chemical Corporation, Morristown, New Jersey. Speakers and topics were the following:

(1) "The Development of Color-Difference Equations" by Henry Hemmendinger.

(2) "The Accuracy of Color Difference Calculations" by Hugh Davidson.

(3) "The Application of Color Difference Formulas" by Ruth M. Johnston.

All of the speakers are associated with the Davidson and Hemmendinger Division of Kollmorgen, Inc. in Easton, Pennsylvania. An overflow audience participated enthusiastically in the panel discussion following the presentation of the papers. The papers will be published in a forthcoming issue of the Journal of Paint Technology. We plan that the Federation will make reprints of this symposium available to all ISCC members.

A special one-day symposium on color was sponsored jointly by the Montreal and Toronto Societies for Paint Technology and presented on successive days in both cities, September 18, 1968 in Montreal and September 19 in Toronto. The program included the presentation of the following papers:

(1) "Introduction to Color and Colorimetry" by E. K. Cooper, Canadian Pittsburgh Industries, Ltd., Toronto.

(2) "Color Matching, Computers, and Common Sense," by Max Saltzman, Allied Chemical Corporation, Morristown, New Jersey.

(3) "Color Standards and Color Tolerances" by W. Kolanitch, Sherwin-Williams Company of Canada, Ltd., Montreal.

(4) "Color Control in the Small Paint Plant" by Ruth M. Johnston, Davidson and Hemmendinger, Easton, Pennsylvania.

A panel discussion followed when the speakers were joined by Mr. R. E. Means, IBM, Chicago and Gunther Wysecki, National Research Council of Canada, Ottawa. Large and interested audiences attended the Symposia in both cities.

Mr. S. Leonard Davidson, chairman of the ISCC Committee of the Federation has resigned his chairmanship of the committee after the 1968 Fall Federation Annual Meeting in order to take up the very responsible position as Treasurer of the Federation. Lenny served eight years as chairman and did much to aid in educating Federation members in the science of colorimetry. Under his chairmanship the three symposia "The Fundamentals and Problems of Color" were presented at the Federation annual meetings. The first of these was presented in 1962, the second in 1965 and the final one in 1968. In recognition of his many contributions he has been named honorary co-chairman of the ISCC Committee of the Federation. Miss Ruth M. Johnston has been named as the new chairman of the Federation's ISCC Committee and Chairman of the Delegation from the Federation. Other members of the delegation are Richard Alexander, E. Kip Cooper, Sam Huey, George R. Jensen, Henry W. Levison, Larry Miller, Norman Moore, Max Saltzman, and Frank R. Spinelli.

Publications in the Journal of Paint Technology of possible interest to ISCC members are listed below.

Journal of Paint Technology

Publications in 1968 (Vol. 40) Concerned with Color, Appearance, and Pigment Behavior

Rolles, R., and Luyk, K. E., "Optical Properties of Nonleafing Aluminum Pigments," February, page 85.

Dunn, E. J., Swarta, H. E., Baier, C. H., and Zuccarello, R. K., "Agglomeration of Pigment Particles in Dried Paint Films," March, page 112.

Billmeyer, F. W. Jr., Abrams, R. L., and Davidson, J. G., "Color and Appearance Properties of Paint Films," April, Page 143.

Williams, G. G. and Howard, R. R., "Effect of Film Pigment and Substrate Colors on the Reflectance of Paint Films," May, Page 229.

Mitton, P. B., and Stalte, A. J., "Instrumental Method for Measuring the Tinting Strength of White Pigments," July, Page 308.

Papillo, P. J., "Accelerated Outdoor Weatherability

Testing of Pigments in Paint," September, Page 359.

Judd, D. B., "Color Science and the Paint Industry," October, Page 470.

Buttignol, V. "Optical Behavior of Iron Oxide Pigments" (1968 First Prize Roon Foundation Award Paper), November, Page 479.

Baltimore Society for Paint Technology, "Gloss Readings: An Illusion of Accuracy," December, Page 572.

New England Society for Paint Technology, "Effects of Force Drying on Color in Air Dry Enamels," December, Page 595.

REPORT OF THE GRAPHIC ARTS TECHNICAL FOUNDATION DELEGATES, FRANCIS L. COX, CHAIRMAN

During the year 1968 the following Research Progress pertaining to Color were published:

No. 76 "GATF Standard Offset Color Control Bars"

No. 79 "GATF Compact Color Test Strip"

A "Color and Printing Factors Computer" was designed to simplify calculations for grayness, hue error, process ink efficiency, ink trapping, and Equivalent Dot Area of printed tints and film tints.

Procedures for "cross-referencing" reflection densitometers were established. This is accomplished by calibrating a GATF Reference Densitometer Color Target on a "referee" instrument; then other densitometers may duplicate the scale reading by slight calibration adjustment. Details are described in:

"Recommended Practices for Letterpress Proving," GATF Research Department--Report of Progress, p. 233. (1968)

REPORT OF THE GRAVURE TECHNICAL ASSOCIATION DELEGATES, OSCAR SMIEL, CHAIRMAN

Activities with color during 1968 consisted of the following:

1. The beginning of an ink color swatch pamphlet to show advertising agencies what our INK STANDARDS look like when printed on the various paper stocks used by publication printers. This pamphlet is only partially printed at this time and will not be completed due to lack of press time for several months.

2. The G.T.A. Lights and Lighting Committee has recommended the adoption of the U.S.A. Standards Institute PH 2.6 Committee's Draft Standard for view-

ing and illuminating reflection copy and transparencies as well as engravers' proofs. This refers to the 5000 Kelvin compatible viewing standards which are now being tested by many advertising agencies, publishers, engravers, and printers. The G.T.A. has urged its members to test out and adopt these new U.S.A. Standard Institute viewing standards wherever possible and come back to us with the reaction of their clients to a new concept of compatible viewing of copy and proofs. My article on the subject, which appeared in Gravure Magazine last October, drew the highest readership in the history of the Magazine because of the intense interest of the gravure industry in the subject of correct viewing of color copy under standard lighting conditions.

REPORT OF THE ILLUMINATING ENGINEERING SOCIETY DELEGATES, NORMAN MACBETH, CHAIRMAN

The Illuminating Engineering Society delegation is particularly proud this year that Harry Helson of our delegation, is being honored by the Inter-Society Color Council by the presentation of the Godlove Award.

A great deal of Harry Helson's work, sponsored by the Illuminating Engineering Research Institute, was a result of collaboration between members and officers of the Inter-Society Color Council and the Illuminating Engineering Society.

The work that Harry Helson has done in color and lighting has been extensively reported upon in ILLUMINATING ENGINEERING and it is hoped that a summary paper of his work to date can be presented at a future meeting of the Inter-Society Color Council.

During the past year, ILLUMINATING ENGINEERING has published two papers relating to color:

1. Color Contrast vs. Luminance Contrast
2. Color Television for Indoor Hockey Arena

REPORT OF THE INDUSTRIAL DESIGNERS SOCIETY OF AMERICA DELEGATES, RAYMOND SPILMAN, CHAIRMAN

The IDSA report is not available at this time but will be published in a later issue of the N.L. The report will deal with color trends in the areas of the membership's design practice.

REPORT OF THE INSTITUTE OF FOOD TECHNOLOGISTS DELEGATES, GORDON MACKINNEY, CHAIRMAN

IFT delegates are attempting to ascertain the needs of members confronted with color problems. A ques-

tionnaire has been circulated, and a report will be made after the IFT Annual Meeting in Chicago in May 1969.

REPORT OF THE NATIONAL ASSOCIATION OF PRINTING INK MAKERS DELEGATES, F. L. WURZBURG, CHAIRMAN

In last year's report we mentioned that a committee had been set up called the GATF Technical Advisory Committee on Four-Color Letterpress Proofing. The following sub-committees of this committee have now been set up:

1. Sub-committee on AAAA/MPA Standard Color Bars

The objective of this Sub-committee is to produce and distribute a "AAAA/MPA" standard color control bar for photoengravers, advertising agencies, magazine publishers and printers.

2. Sub-committee on AAAA/MPA Standard Proofing Paper

The objective of this Sub-committee is to write specifications for a machine-coated paper, to be used by photoengravers when printing four-color progressives and proofs for four-color reproductions to appear in national magazines.

3. Sub-committee on "Standard" Practices for Proofing

The objective of this committee is to develop procedures and production specifications for "Standard" practices used in the production of progressive proofs for the magazine industry.

4. Sub-committee on "Standards" for Densitometer Use

The objective of this committee is to develop procedures for the most practical use of densitometric instruments for measuring and controlling ink film thickness on progressive proofs.

5. Sub-committee on "Heat-set" Proofing

The objective of this Sub-committee is to develop equipment, materials, and procedures for proofing in color four photo engravings for the magazine industry, which will forecast most accurately the printed results obtained on "heat-set" printing presses.

These Sub-committees have been active throughout the year and considerable progress has been made. A meeting for all of the committees has been scheduled for the middle of May at which time each Sub-committee will report on its progress to date and plans for future work.

Featured at the biannual NPIRI Technical Conference held June 13, 14, 1968 at Lehigh University was a half-day symposium on Color Measurement in Printing Inks. The lectures included "Maximum Color Strength of Pigment Dispersions" by Dr. Albert R. Hanke of E. I. du Pont de Nemours & Co., "Surface Appearance of Printed Films and the Effect on Color" by Richard S. Hunter of Hunter Associates Laboratories, Inc., "Application of Analog and Digital Color Computers in the Printing Ink Industry" by Hugh Davidson of Davidson and Hemmendinger, Inc., and "Computer Color Matching of Printed Ink Films--Problems and Prospects" by Dr. Eugene Allen of Lehigh University.

A research program on Automated Color Matching of Printed Ink Films has been started at the National Printing Ink Research Institute, Lehigh University. The program, under the direction of Dr. Eugene M. Allen, is to determine whether a satisfactory theory can be developed to account for the distribution of printing inks on and in the surface layers of printed matter together with the contribution from the substrate. The first phase is based on the application of the Kubelka-Munk theory to a multiple film model.

NPIRI is evaluating the application of optical transmission measurements to the determination of particle size distribution in dilute pigment suspensions. The Mie Equations are being used to calculate the light absorption and scattering from different particle sizes over the range of wavelengths from the ultraviolet through the infrared.

The Boxboard Research and Development Association is sponsoring at NPIRI a research program to determine the factors involved in the development of gloss finishes on prints and to develop a reliable method for evaluating the gloss holdout properties of paperboard.

The NPIRI biannual course for ink technicians will be held the week of August 4 at Lehigh University. Among the lecturers will be Dr. Allen and Messrs. Bassemir, Erikson and Wurzburg in the field of color.

Standard bleaching white dispersions are commonly employed to evaluate the color strength of pigments and printing inks. For some years NPIRI has made available a standard zinc oxide dispersion in linseed oil for use in conjunction with NPIRI Standard Test Method E-2--"Relative Tinting Strength." A new zinc oxide bleaching white, based on a Hercolyn D vehicle was introduced during 1968 to extend the range of compatibility.

The field of optical character recognition (OCR) is a rapidly growing one and has posed interesting color problems from the ink manufacturers' standpoint. OCR is being increasingly used in various fields such as mark-sense cards, used in educational testing and in business forms; government forms of all sorts; automobile licenses, etc. The problems arise from the fact that it is generally required that there be pre-printed

information on the forms which must not be read by the optical sensing mechanism and that the spectral sensitivities of the various makes of OCR equipment vary quite widely. Mr. DiBernardo of this committee has lectured to a wide variety of groups on this subject and some of the work has been published. References are cited at the end of this report.

1. A. DiBernardo, "Spectrophotometry and OCR Ink Formulations," TAGA Proceedings (1968) pp. 278-287.
2. A. DiBernardo, "The Role of Inks in Machine Communication," American Ink Maker, Vol. XLVI, No. 8, p. 38, August (1968)

REPORT OF THE NATIONAL PAINT, VARNISH AND LACQUER ASSOCIATION DELEGATES, EVERETT R. CALL, CHAIRMAN

The main feature of the Association's work in the color field during the past year has been the production of two films on color. These films were directed to the audience characterized as Mr. and Mrs. Homemaker; they will appeal to Gardens Clubs, Civic Groups, Home Economic Classes and similar groups of all ages. They are intended as a tool for the staff level of manufacturers and retailers; they are educational, informative, sales stimulants, designed to motivate the viewer to buy paint and think paint whenever he thinks color.

The first film is "Paint--A Decorating Genie in a Can"

Color is the magic--the viewer the potential magician --and paint literally steals the show in the National Paint, Varnish and Lacquer Association's new film on color and decorating.

But unlike the mystic genie of Aladdin's day, paint's magic centers on practical penny-wise decorating ideas to fool both the eye--and the budget! Small rooms seem larger; large rooms grow cozier; long rooms appear wider--in scene after scene, little splashes of color perform major decorating miracles.

Even the exterior takes on a color personality--with an endless variety of paint tricks that protect and provide "color excitement" from the roof to the foundation.

"Paint--A Decorating Genie in a Can" is 15-1/2 minutes of budget-wise ideas for creating color magic inside and outside the home. And, paint is that extra special "economic genie" that makes it all possible!

The second film is "Color--The Magic Touch"

Color--Light--Paint: three elements combined effectively in a 15-minute film to help your customers understand the changeable qualities of paint colors under different light sources.

The film contains simple instructions for developing and using a color wheel in making paint selections and decorating decisions. Helpful hints inspire consumer confidence and stimulate interest in paint's vital role in interior decorating.

Whether you choose "Paint--A Decorating Genie in a Can" (15-1/2 minutes), "Color--The Magic Touch" (15-minute version)--or the 27-1/2 minute combination of both films, you're certain to boost sales! They're a colorful, exciting way to SHOW and TELL your customers how easy it is to protect and decorate with paint! Paint is the star performer--the viewer is your customer.

In addition to the films the Association has been active in other fields of color designed to make color a more effective sales tool for our Industry. A considerable amount of work is in progress and hopefully can be reported in final form by next year.

REPORT OF THE NATIONAL SOCIETY OF INTERIOR DESIGNERS DELEGATES, DEDE DRAPER, CHAIRMAN

1968-69 reflects the impact of the Art World on Interior Design. Psychedelic colors on fabrics and wallcoverings; the new wet look of vinyls; the extended use of metallics; mirrors in silver, gunmetal and bronze for walls and furniture; acrylic rods and cubes for lighting; plexiglas in color for furniture; the new molded plastics for all types of seating, tables, and lamps; highly lacquered wood furniture in bright colors--all necessarily influencing the background color to contain them.

In juxtaposition to the brilliant admixture of primary and secondary colors is the popularity of black and white. Large areas of white, punctuated with accents of black, and pattern, pattern everywhere--stripes, plaids, dots--all very Op!

A surprising innovation is the wide use of brown--rich, chocolate brown, used on walls (in lacquer rather than flat paint) on furniture in deep pile plush and floors. Accents of silver are often combined with the brown: in wallpapers--silver foil; in furniture--chrome, aluminum and steel--and in lighting fixtures.

This new look in fabrics, furniture, and lighting is very "in" with the now generation, and is not to be lightly dismissed in our youth-oriented society. Institutional, recreational, and educational interiors catering to the young cannot help but be influenced by the preferences young people are now expressing for their private dwellings.

Even the more conservative client wants to buy a "piece of the action": wet-look wallcoverings in kitchens and bathrooms or molded plastic furniture for the Den to show that they are with it.

REPORT OF THE OPTICAL SOCIETY OF AMERICA DELEGATES, DOROTHY NICKERSON, CHAIRMAN

The Optical Society of America has held two regular meetings since our report of last year: in Pittsburgh, Pa., October 1968; in San Diego, Cal., March 1969.

The Pittsburgh meetings included a session on Color, Vision, and Physiological Optics, at which there were reports on metamerism and color rendering by Nimeroff, on a matrix model for color perceptibility ellipsoids by Chickering, and on visibility of colors underwater using artificial illumination by Kinney and associates. Invited papers included four on holography. The Frederic Ives Award was presented to Dr. E. U. Condon for his basic and valuable contributions to atomic spectroscopy.

The San Diego meeting included a session on Color and Physiological Optics, with papers on measurement of absolute spectral-radiance factors of white samples by Robertson, perception of chromaticness differences among near-neutral colors by Howett, color-difference and the CIE 1960 UCS diagram by Yonemura, a direct-reading color difference meter based on cube-root color coordinates by Faulhaber and Witherell, prediction of perceived color in three-primary projections by Pearson and Rubenstein, and several papers relating to color vision. Several of the invited papers concerned hydro-optics and oceanography, one by Duntley on optical exploration of the oceans. Dr. Howard Cary received the David Richardson Award, and Dr. Lorrin A. Riggs was awarded the Tillyer medal for outstanding research in vision. Sessions of the Technical Group on Color, held at both meetings under the chairmanship of Dr. Gunter Wyszecki, continue to be popular.

In 1968 publication of papers relating to color averaged one or two for each issue of the Journal of the society. The April 1969 number of Applied Optics, also an OSA publication, will be devoted to "Color Measurement."

The list of representatives from OSA to the ISCC remains unchanged for 1969.

REPORT OF THE PACKAGE DESIGNERS COUNCIL DELEGATES, KARL FINK, CHAIRMAN

Although the year has been an active one, PDC's efforts were not in color, as isolated from design. There are tentative plans for a color program in 1969 or early 1970, where color-in-packaging will be the separate and prime concern.

REPORT OF THE PAPERBOARD PACKAGING COUNCIL DELEGATES, WILLIAM B. LEAVENS, JR., CHAIRMAN

The members of the Paperboard Packaging Council are primarily interested in the practical use of color in the

following areas:

1. Inks that meet the requirements of our customers, which are more rigorous than is usually met in the printing industry.
2. Methods of color control during printing to assure that the work turned out is within color variation tolerances acceptable to the customer.
3. Preparation and submitting of color standards, often with the additional requirement of getting acceptance of light and dark limits.

Each member company has set up its own methods of achieving the above ends. There are no standardized industry methods and from my experience with the industry there is little likelihood of the development of acceptable uniform procedures.

I consider my task as a delegate to the Inter-Society Color Council as being one of following the published proceeding of the Council and advising the Paperboard Packaging Council of any items which will be particularly helpful to members of the P.P.C. A distribution was made to members of the ISCC-NBS CENTROID Color Charts. I have followed the activities of the Inter-Society Color Council for a number of years. I am recommending that the Paperboard Packaging Council continue its support.

**REPORT OF THE SOCIETY OF MOTION PICTURE
AND TELEVISION ENGINEERS DELEGATES, R. M.
EVANS, CHAIRMAN**

This year has seen an even greater use of color by the television industry. A number of long-standing problems still exist, one of which deals with the optimum color balance for a subtractive original film which has to be transmitted and displayed by an additive system. The answer will be found empirically, and the society's Color Committee has continued to play the leading role in this effort. A problem of increasing importance has been how to transmit with optimum quality a motion picture print that has been made for the theater.

The articles on color that were published in the journal have been submitted to the News Letter Bibliography Committee.

**ARTICLES ON COLOR APPEARING IN THE JOURNAL
OF THE SOCIETY OF MOTION PICTURE & TELE-
VISION ENGINEERS IN 1968**

Color Perception and Color Television C. J. Bartleson
77: 1-12, Jan. 1968

Electronic Standards Conversion for Transatlantic
Color Television E. R. Rout & R. E. Davies 77: 12-17,
Jan. 1968

A New Color Print Filmstock R. G. L. Verbrugghe
77: 29-34, Jan. 1968

Design of Components for High-Quality and High-
Reliability Color Television Y. Itoh, T. Katsuta, T.
Imai, K. Saitoh & J. Hirate 77: 96-108, Feb. 1968

Optimum Color Analysis Characteristics and Matrices
for Color Television Cameras with Three Receptors
A. H. Jones 77: 108-116, Feb. 1968

Measurement of Television Picture Impairments
Caused by Linear Distortions Hans Schmid 77: 215-
221, March 1968

Improved Signal Processing Techniques for Color
Television Broadcasting R. H. McMann, Jr. and A. A.
Goldberg 77: 221-228, March 1968

A Continuous Simplified Single-Line Color-Bar (SLCB)
Test Signal Facility in Color Cameras J. S. Auld and
G. V. Rao 77: 228-233, March 1968

The Quality Rating of Color Television Pictures L. E.
Weaver 77: 610-613, June 1968

Color Calibrator for Monitors in Television Studios
C. L. Sanders, W. Gaw and G. Wyszeczi 77: 622-624,
June 1968

The Chromaticity of Reference White in Color Tele-
vision Charles J. Hirsch 77: 702-714, July 1968

Color Video-Tape Recorder for Home Use Hisao
Tajiri et al. 77: 727-735, July 1968

A Simplified Color Television Camera S. W. Athey and
G. P. Hobbs 77: 799-804, Aug. 1968

A New Additive Light Source With Color Control for
Motion-Picture Printers Armand Roux and Jean Vivie
77: 806-809, Aug. 1968

Obtaining Color Television Pictures From Space
Donald T. Heckel, Ronald L. Quandt and L. Harold
Allen 77: 905-909, Sept. 1968

A Simplified Television Color Encoder Csaba Koblos
77: 909-912, Sept. 1968

A New, Higher Speed Color Negative Film Raymond L.
Beeler, Robert A. Morris and C. Weston Simonds 77:
988-990, Sept. 1968

An Improved Color Internegative Film Robert C.
Brown, Robert A. Morris and Reid J. O'Connell 77:
990-1005, Sept. 1968

Subjective (Induced) Color Television James F. But-
terfield 77: 1025-1029, Oct. 1968

Preparation of Duplicate Negatives Using Eastman

Color Reversal Intermediate Film Clark Beckett et al. 77: 1053-1057, Oct. 1968

An Accelerated Process for Anscochrome Color Films William L. Wike 77: 1142-1150, Oct. 1968

Characteristics and Applications of a New High-Speed Color Film--Anscochrome D/500 F. C. Forsgard et al. 77: 1150-1154, Oct. 1968

Processing Eastman Color Print Film at 80 F. K. D. Fowler, R. A. Morris and F. J. O'Boyle 77: 1154-1167, Oct. 1968

Limitations of Nonphased Color Video-Tape Recording Systems in Television Broadcasting A. J. Buxton and C. P. Ginsburg 77: 1167-1171, Nov. 1968

Ad Hoc Color Television Study Committee Formed William T. Wintringham 77: 1203-1204, Nov. 1968

Recent Agreements Reached by the Colorimetry Committee of the Commission Internationale de l'Eclairage Gunter Wyszecki 77: 1210-1279, Nov. 1968

A New Approach to Color Slow-Motion Video Recording Clarence Boice 77: 1300-1303, Dec. 1968

REPORT OF THE SOCIETY OF PHOTOGRAPHIC SCIENTISTS AND ENGINEERS DELEGATES, ALBERT J. DERR, CHAIRMAN

We are pleased to present our annual report indicating a continued interest in the science of color by the members of the Society of Photographic Scientists and Engineers. This is indicated by the diversity of papers of interest to members of the Council which were published in our journal, "Photographic Science and Engineering." This bibliography is attached to this report. We also note the active participation by delegates in the affairs of the Council and welcome a new member to our delegation, Mr. Russell Gray, who is also an individual member of the Council.

The Annual Conference of S.P.S.E. will be held May 12-16, 1969 at Los Angeles, California. A number of papers covering the use of color will be distributed among several sessions on photographic applications.

Thank you for the opportunity for S.P.S.E. to participate in the work of the Council.

BIBLIOGRAPHY

Articles of Color Interest

Photographic Science and Engineering
Vol. 12, 1968

H. Frieser and M. Schlesigger; "Analogous Considerations of Spectral Sensitization of Different Photographic Systems" p. 2

J. Gorley, H. T. Rib, and R. D. Miles; "Automatic Technique for Abstracting Color Descriptions from Aerial Photography" p. 17

C. J. Bartleson; "Visual Comparison of Photographic Transparencies and Photomechanical Reflection" p. 27

C. W. Jerome, "The CIE Color Rendering Index" p. 57

Tadaaki Tani, Shin-Ichi Kikuchi and Ken-Ichi Honda; "Modified Electron Transfer Mechanism for Spectral Sensitization in Photography" p. 80

A. E. Rosenoff, K. S. Norland, A. E. Ames, V. K. Walworth, and G. R. Bird; "The Resolved Spectra of Small Cyanine Dye Aggregates and a Mechanism of Supersensitization" p. 185

George R. Bird, Kenneth S. Norland, Alan E. Rosenoff, and Hazel Bryant Michaud; "Spectra and Structure of Sensitizing Dye Aggregates" p. 196

W. Kraus; "Short Communication: The Illumination of the Emulsion for Photographic Granularity Measurements" p. 217

R. G. Hawe; "Electrostatic Trigger Used for Daylight Lightning Photography" p. 219

REPORT OF THE SOCIETY OF PLASTICS ENGINEERS DELEGATES, M. M. GERSON, CHAIRMAN

Color activities within the Society of Plastics Engineers are co-ordinated by the COLORING AND FINISHING OF PLASTICS PROFESSIONAL ACTIVITIES GROUP UNDER THE CHAIRMANSHIP OF MR. WILLIAM LONGLEY. Two of the SPE delegates serve as officers of ISCC, Dr. Fred Billmeyer, Jr. is President and Mr. W. N. Hale is a member of the Board of Directors.

As is its annual practice, a program on "color problems" in plastics was presented at the SPE Annual Technical Conference in May, 1968 in New York under the sponsorship of COFINPAG. While special attention was paid to specific problems in the coloration of specific plastics, general subjects in the field of color matching and instrumentation for plastics color problems were thoroughly discussed.

COFINPAG also sponsored a Regional Technical Conference in Cleveland, Ohio on January 21, 1969 on the subject of Coloring of Plastics. One half of the program was devoted to specific plastics problems; the other half was devoted to the capabilities of instruments for solving today's color problems. The latter portion of the program was presented as a panel discussion consisting of a panel of specialists from the various manufacturers of color instrumentation equipment and moderated by Mr. Max Saltzman. This RETEC program

included a comprehensive review of performance of 15 color instruments by Dr. Billmeyer. The work was performed at Rensselaer Polytechnic Institute.

In addition to the above papers published in the "Preprints" for the respective meetings, the SPE Journal published the following papers on the subject of "color":

1. "Coloring and Finishing--Technical Progress" by R. A. Charvat, June, Page 38
2. "Dichroism of Transparent Colorants" by T. G. Webber, September, Page 29
3. "Polymeric Dye Receptors for Polypropylene Fiber" by M. Farber, August, Page 82

REPORT OF THE TECHNICAL ASSOCIATION OF THE GRAPHIC ARTS DELEGATES, H. BRENT ARCHER, CHAIRMAN

The Color Committee of the Technical Association of the Graphic Arts has been inactive recently, inasmuch as it has not sponsored any projects. However, the presentation of papers in TAGA that are related to the field of color technology continues. Of particular interest is 1968's paper by Pearson, Pobboravsky, and Yule on the "Computation of the Halftone Color Gamuts of Process Inks."

Other activity continues but on an independent level. At this year's convention to be held in Washington on May 18 through 21, John A. C. Yule will present important information on the standardization of densitometers for the graphic arts.

PRELIMINARY PROGRAM OF AIC

Earlier issues of the N.L. have included information, as it became available, about the forthcoming meeting of The International Colo(u)r Association (AIC) to be held at the Royal Institute of Technology, Stockholm, Sweden, June 9-13, 1969. The preliminary program is now available.

Invited addresses have been scheduled as follows:

June 9. Anders Hård: "Quality Attributes of Colour Perception." Russell de Valois: "Analysis and Encoding of Colour Information and the Visual Nervous System."

June 11. Yves LeGrand: "Théories sur la metrique de l'espace des couleurs."

June 12. Robert Theile: "Grundlagen und aktuelle Problemen der Farbfernsehtechnik."

June 13. W. D. Wright: "The Teaching of Colour--Challenge and Opportunity."

In addition to the invited lectures, there will be many papers in sessions covering New Instruments; Colour Preferences; Colour Vision; Geometry of Instruments; Colour Rendering; Colour Appearance; Colour in Architecture; Colour Metrics; Uses of Colour in Art, Traffic, etc.; Colour Control; Colour Reproduction; Teaching of Colour; Colour Differences; Theory of Colorimetry; Colour Associations; Colorant Formula-tion; Metamerism; and Instrument Performance and Standards.

JOINT MEETING OF ISCC AND THE COLOUR GROUP

Following the AIC meeting in Stockholm, there will be a joint meeting of the Inter-Society Color Council and the Colour Group (Great Britain), to be held at Imperial College, London, on June 17, 1969, with an evening social event on June 16. This is the first international meeting of these societies, and is scheduled to follow the AIC meeting in the hope that many of those from the United States attending the latter meeting can arrange to be in London also as guests of our British colleagues.

Mrs. Dorothy Morley of the Colour Group has arranged a program of short informal discussions by British participants, as follows:

Keith McLaren, ICI: Amplification of his Stockholm paper on Computer Match Prediction and color differences.

Jean Noir, Courtaulds: Color-difference formulas.

A. E. Cutler: A new computer for match prediction.

David Palmer, Institute of Ophthalmology: Amplification of his Stockholm paper on the varying weighting of luminance with intensity.

C. A. Padgham, City University: Psychophysical techniques for luminosity scaling.

The U.S. contributions to the program have not yet been established, but arrangements are being made by President Billmeyer.

ASP-SPSE JOINT SEMINAR

The American Society of Photogrammetry and the Society of Photographic Scientists and Engineers will sponsor a joint seminar on "New Horizons in Color Aerial Photography," June 9-11, 1969, in New York City at the Summit Hotel. This seminar will be held in conjunction with another major photographic event, Photo-Expo 69, an industry-wide exhibit of all things

pertaining to every conceivable aspect of photography.

Top experts in both the theory and applications of color aerial photography will present invited papers. For additional information, contact ASP-SPSE Joint Seminar, 105 N. Virginia Ave., Falls Church, Va. Phone: (202) 347-1140 or (703) 534-6617.

EXHIBITION BY NEW YORK GUILD OF HANDWEAVERS

An exhibition entitled "Counterchange and New Color" is currently being presented at the Cooper-Hewitt Museum of Design, Third Avenue at 7th Street, New York City. The exhibition will continue through May 24th and includes demonstrations of spinning and weaving.

SUMMER PROGRAM IN COLOR TECHNOLOGY AT RENSSELAER

A summer program in color technology is being offered for the fifth consecutive year by the Rensselaer Color Measurement Laboratory at Rensselaer Polytechnic Institute. The three intensive courses are:

Principles of Color Technology, August 11-15

Color Technology for Management, August 21-22

Advanced Color Measurement, August 25-29

The courses are under the direction of Dr. Fred W. Billmeyer, Jr., Professor of Analytical Chemistry at RPI, assisted by Max Saltzman, Manager of Color Technology, Allied Chemical Corporation and Adjunct Professor of Chemistry at Rensselaer.

Principles of Color Technology

This course is intended to provide both theory and practice in the description, specification and measurement of color. It will be of particular interest to industrial personnel responsible for color matching and color control.

--Typical commercial color measurement and computation equipment will be available for use by the individuals participating in the program.

--Laboratory sessions will be held daily for instrumental measurements, computations, and problem-solving.

--Both theoretical concepts and practical applications of the science of color will be emphasized.

--The course will be of particular value to men without advanced degrees and to men whose practical experience in the field is a substitute for a college

degree.

--Companies maintaining or planning color control laboratories will have the opportunity of increasing their efficiency and effectiveness by using the program to train staff members in the proper use of color measuring equipment and the interpretation and application of the results of such measurements.

Color Technology for Management

This two-day course is designed to aid executives responsible for research, production or sales of colored products in reaching correct management decisions based on the principles of color technology.

Advanced Color Measurement

This is a limited-attendance laboratory course which will provide individual instruction to a group of not more than 12 participants. In general, the qualifications for attendance are two or more years' experience in instrumental color measurement; or a shorter period of experience plus completion of the course, Principles of Color Technology, or an equivalent course elsewhere.

For further information contact the Office of Continuing Studies, Color Technology Program, Rensselaer Polytechnic Institute, Troy, New York 12181, or see the brochures enclosed with this issue of the N.L.

SHORT COURSE IN FOOD COLORIMETRY

On June 24-26, 1969, the Food Science Color Laboratory, Department of Food Science and Technology, University of Massachusetts, Amherst, Massachusetts 01003, will conduct a short course on colorimetry of foods.

The course is designed as an introduction to the science of color measurement in foods. Time will be divided equally between basic color theory and food applications.

The deadline for applications is June 16, and the course is limited to 30.

Additional details may be obtained from Dr. F. J. Francis at the above address.

News Letter Committee:

Randall M. Hanes, Chairman
Deane B. Judd

William J. Kiernan
Dorothy Nickerson

Send News Letter items to Editor:

Randall M. Hanes
Applied Physics Laboratory
The Johns Hopkins University
8621 Georgia Avenue
Silver Spring, Maryland 20910

Other correspondence to Secretary:

Ralph M. Evans
Photographic Technology Division
Eastman Kodak Company
Rochester, New York 14650