

# Inter-Society Color Council Newsletter

NUMBER 205  
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## AN OVERVIEW OF THE ISCC ANNUAL MEETING

The 39th Annual Meeting of the Inter-Society Color Council probably came as close to matching the purpose of the ISCC as any meeting in recent memory. This was, indeed, a meeting of all the different disciplines and interests represented in the Council.

The programs of Monday and Tuesday brought a wide variety of ideas and information to the Council members. On Monday afternoon, Dr. John Ott, Chairman and Executive Director of Environmental Health and Light Research Institute of Sarasota, Florida, presented an illustrated lecture on "Physiological Aspects of Psychological Responses to Color." This was, as some of us have come to expect from Dr. Ott, very well illustrated. It emphasized a subject which has been largely neglected until quite recently. In particular, Dr. Ott discussed the biological effects of light on organisms.

Tuesday morning, Dr. Harry Helson of the University of Massachusetts in Amherst, presented a summary of the results of a research project sponsored by the Illuminating Engineering Research Institute. This presentation was entitled "Factors Affecting the Pleasantness of Object-Background Color Combinations." Dr. Helson summarized very well a mammoth collection of data from his experiments on affective value of colors and color combinations. Work of this kind, particularly work of the caliber of that conducted by Dr. Helson, is always a welcome addition to our store of knowledge for there is, unfortunately, very little valid experimental work in the field of color aesthetics. Certainly, this report did much to provide a basis for better communication between the technologist and the aesthetician. His full report is to be published in the July Issue of *Applied Optics* and Dr. Deane B. Judd will publish an interpretative summary in a forthcoming issue of *Illuminating Engineering*.

## FROM THE EDITOR

The experimental format used in the last issue of the News Letter was well received by 30 out of 31 readers who replied. Typical comments were "speeds up the location of items of special interest," "much more legible," "clearer," "much easier to read," "faster comprehension rate attainable," "like the bold print for titles," "greater ease of scanning," "better looking esthetically," "less monotony."

One design expert, Mr. Karl Fink, felt that we had departed too much from his concept of good design, and suggested a format based on principles being developed by IBM for computer-based photocomposition. He has agreed to assist in moving in that more modern direction in the future.

At the moment, however, because of the favorable responses of our other readers, we feel that we owe it to them to continue with the experimental format. We shall not right-justify as in the first issue, but will create "more air" between columns by keeping a "ragged edge" as before.

On Tuesday afternoon, a symposium was held to discuss "The Use of Color in Art and Science." Dr. Robert W. Burnham, who as Chairman arranged this symposium, indicated that it was an experiment to see what, if any, kinds of communication would exist or possibly evolve from discussions between scientists and artists. Each of six speakers, Mr. Walter C. Granville, Professor Harry Helson, Professor Dorothea Jameson Hurvich, The Reverend Alfred A. Juliano, Mr. Calvin S. McCamy, and Mr. Frank C. Wright, presented their own thoughts on the subject and then a panel of respondents, Mr. C. J. Bartleson, Dr. Jo Ann S. Kinney, and Mr. Raymond Spilman each, in turn, responded to the speakers' remarks with comments of their own. What seemed to emerge from this symposium was a suggestion that artists and scientists could, indeed, communicate if they would take the time and make the effort to try to listen to what the other fellow was trying to say in his own special language. In general, there seemed to be considerable interest in the symposium and, particularly, in the fact that it

brought together people of divergent backgrounds and interests in a common arena to discuss the subject of color. This is, after all, one of the principal purposes of the Council itself and it was encouraging to know that there does appear to be a basis for intercourse among people with greatly different interests but coincident concern for the use of color.

The reception and banquet on Tuesday evening was followed by an illustrated lecture entitled "More to Color Than Meets the Eye" by Dr. Robert W. Burnham. This lecture was most consistent with the entire tenor of the meeting in that it approached the subject of color from the simplest considerations and, before the evening was over, led the audience through a labyrinth of technically and aesthetically complex concepts in a most delightful and painless manner. This lecture was actually presented to the ISCC about 15 years ago in a somewhat modified form, but the presentation on April 14th, 1970 was as fresh and new as if it had been written for the occasion. The excellent color illustrations combined with Dr. Burnham's ability to catch the interest of his audience and lead them smoothly along the fascinating paths of his topics provided an excellent ending to what was a most interesting ISCC program.

I am sure that there are other things that probably ought to be said but I have deliberately restricted my comments to the papers and presentations included in the meeting.

C. J. Bartleson

## AN IMPRESSION OF THE ANNUAL MEETING

Retiring president, Fred Billmeyer, summed up the annual meeting in a single comment: he reported that this is the first meeting in his experience which was praised by both the technical and design people in the Council. I was also struck by the number of new faces which I saw there. I took this as an indication that many representatives from the design groups are beginning to feel that ISCC is not the exclusive bailiwick of the technical colorists. I won't go so far as to say that the designers and technicians are beginning to understand each other, but I will speculate that a new rapport has been established. We will have arrived when at least a third of the Problems Sub-Committee meetings deals with the design or affective qualities of color.

Harry Helson's research report, "Factors Affecting the Pleasantness of Object Background Color Combinations," indicates at least some movement in that direction. It was very gratifying to me that ISCC was able to provide some factual information concerning the affective quality in the

use of color. I guess that one of the comments I heard was inevitable, that Dr. Helson has succeeded in giving documented evidence for facts which designers have known all along. The point, however, as I see it, is that here is a well-documented research project to substantiate what we have had to accept on faith or intuition. One thing does concern me about Dr. Helson's work. It relates to discussions which took place several years ago, concerning the determination of the affective qualities of color using color patches. During a discussion with several psychologists, one of them commented that he felt the only thing one could learn from getting responses to color patches was what kind of color patches one likes. I guess it is difficult to extrapolate from determinations of these small patches to walls, automobiles, clothing, refrigerators, and the like. Still no one can deny that Dr. Helson has some very concrete data even though the interpretation may be difficult. It definitely points the way toward updating solid evidence in an area so long fraught with uncertainty and conflict.

Dr. Burnham's symposium on the use of color in art and science provided an excellent forum for exchange between technical and design people. Prior to this symposium, many people asked the question, "how can designers communicate with technical people in order to make use of the knowledge which technical people have?" Perhaps more appropriate questions are, "do technical people have information of interest to designers and colorists?" and, finally, "can designers and colorists communicate with technical people?" Several of the Board members have worked diligently on the assumption that the answers to these latter two questions are, "yes." For example, both Midge Wilson and Karl Fink have devoted much of their time and effort to breaking down those barriers. Recent meetings attest to their success. Nevertheless while both technical people and designers and colorists found the symposium to be satisfying and rewarding, the questions remain in my mind.

It is gratifying to me that this effort has defined some common ground. The rewards and satisfactions that we enjoy from this pursuit are the reasons for the Inter-Society Color Council. Many years ago I referred to color as the element which binds many diverse groups together in the Inter-Society Color Council. Each year I continue to be amazed and delighted by the strength of that bond.

W. L. Rhodes

## FROM THE EDITOR

The formal program was to me and all others, preempted by the charming — and subtle —

psychological atmosphere of the banquet. Thanks to Midge Wilson for her planning and follow-through, and the remarkable paintings of Herb Aach which helped to implement this plan, the evening was a total success. Our retiring President was of course given the opportunity of reading the delightful script prepared by Midge Wilson. It is regrettable that the script cannot (budget, you know) be augmented here by the unusual and exciting "visuals" presented, but here is the script — and we'll leave it to you to complete the psychoanalysis.

## RORSCHACH — A LA COULEUR

Decorations this evening are dedicated to the SPIRIT of science. On the tables are assorted alter egos and split personalities.

The exhibit on the wall presents the new color-graphological interpretations of six of our outstanding members. This science combines the individual's signature with the color aspects of his personality. This newly developed science is considered by authorities to be far more accurate and revealing than the Rorschach test.

We are indebted to Mr. Herbert Aach for his superb color renditions. Each is a signed original.

To indicate some of the fine points revealed by this new technique, we will give a brief reading of each. Starting with the first color-graphological form at the far end of the room, this reveals a young, enthusiastic personality. Note how both the configuration and the lighter colors rise to the top. The brightly striped background shows a person frequently concerned with the NEGATIVE . . . but in a POSITIVE way. The bright orange, magenta and green spots manifest a good conversationalist, with ability to mesmerize an audience. While not a biologist, you can glean from the green symbol at the bottom that he is frequently involved with SHUTTER-BUGS. The sharp outlines indicate outstanding ability to FOCUS on details and FILTER out unimportant elements. His greatest concern is perfect DEVELOPMENTS. It is also obvious that he is a BOOKIE — having several tomes to his credit.

On the second signature, the dominance of orange indicates a person with great energy and drive, — one who is particularly sensitive to SUB-CONSCIOUS RESPONSES. White, surrounding the central figure denotes the HYPNOTIC POWERS of a SKILLED ANALYST. The balanced position of the greens signifies good business and financial sense; while the blue field is typical of an excellent host and congenial companion, interested in stimulating conversation. The explosive burst at

the top confirms a dedication to EXPERIMENTAL investigations.

The third illustration: Though a PIPE and TUBE specialist, this person is not a plumber. From the intricate design it is obvious that he is associated with a UNIQUE DISTILLING OPERATION. The elongated pattern depicts a person deeply involved with elaborate APPARATUS. The bright spots enclosed in circles reveal a person who tends to be an introvert, while the radiating circles indicate a good mixer and congenial host. The two orange spots in a PARA position show great involvement with CATALYSTS and the somewhat subversive BENZINE RING.

Number 4: This concise graphological design reflects a person who thinks logically and knows where he is going. The arrowhead cap shows an ability to get to the core of an idea. The outer ring of blue reflects stalwart determination, — a man who can put his foot down with conviction and is even capable of throwing his weight around. The orange glow around the central figure highlights a gourmet and the three shades of green confirm he is VERY ASTUTE IN MONEY MATTERS. The strong red outer area belongs to a person who is master of CAREFULLY CONTROLLED CONDITIONS, — a man who NEVER WORKS IN THE DARK. It may also be observed that he specializes in SWITCHES and prefers to have them on, rather than off. Though no snob, he LOOKS DOWN UPON MOST PEOPLE.

Number 5: The details in this colorgraph are particularly interesting. The balanced relationship between the four bright spots is typical of a shrewd, practical, intelligent person. The green floating cloud reveals a CARD SHARK and an INFORMER, adept at sleuthing. The orange ring placed within the green ring confirms that he is interested in NOTES, though not operating within banking circles. The apricot arrowhead, positioned within the box, represents the skilled touch of a TEN-FINGER OPERATOR. From the caducean formation one can easily see he is interested in ORGANS and even believes in having a DOCTOR IN THE HOUSE.

Number 6: The burst of light color, coming out of the background of dark blue indicates an incurable optimist. The separate and distinct patterns and colors show a man who thinks logically and clearly and concentrates on essential details. An expert at COPIES, he has great respect for original documents. The prominence of orange patterns reveals his early interest in MICRO MINIS. Though well-versed in all areas, he is more closely associated with things of GREEK origin.

If you have not already identified these distin-



guished gentlemen from these clues, at the end of the program you may check your judgments against the original signatures at the bottom of each color-graph.

Midge Wilson

## OTT ON PHYSIOLOGICAL ASPECTS OF PSYCHOLOGICAL RESPONSES TO COLOR

The approach to new horizons is typically dependent on deep curiosity by some one individual. The approach is sometimes formally academic, but may take any informal but motivated course. Thomas Edison, for example, was deeply curious, but many of his discoveries resulted from a non-academic or informal approach. Our first speaker, on Monday afternoon at the ISCC Annual Meeting, Dr. John Ott, was apologetic about the fact that he had not been "formally" prepared for what he discovered. It was, however, manifestly clear that what started as a hobby stretched over a new horizon of knowledge that is thoroughly exciting, to say the least, and opened the door for research and information that might otherwise have been impossible.

His initial interest was in time-lapse photography, in the opening of flowers, and in the ballets that can be constructed from the timed movements of gently waving geranium leaves (for Walt Disney Productions).

By whatever route, his interest extended to plants that didn't thrive too well under some conditions, and he (inspirationally) began to explore the selective use of electromagnetic energy in producing healthy flora. Flora led to fauna. Coincidental with his discoveries, which were really concerned with the physiological aspects of plant "behavior," it became known that light — or more broadly electromagnetic energy — that enters the animal eye, does much more than produce color or vision as a conscious response. The pigmented epithelium, at the back of the eye, which had always appeared to be a comfortable resting place for the sensitive ends of the rods and cones which mediate vision, was found to mediate other organic responses in the endocrine system of the entire body.

"Color has long been known to produce psychological responses in man. However, color is only a very loose way of identifying certain wavelengths of light energy within the total electromagnetic spectrum. There is now evidence to suggest that specific wavelengths, both within and beyond the range of visible light, cause positive physiological responses in the retinal hypothalamic endocrine system that controls production of hormones. This influences human reaction, and it becomes increasingly difficult to distin-

guish between the physiological and psychological influence of color."

Remarkable effects on behavior were described, not the least of which were emotional problems mediated through the endocrine system, which were found in school children whose teachers pulled down the window shades and thereby eliminated spectral radiation that normally supplemented the fluorescent ceiling tubes. The problems were eliminated by the transfer of a new teacher who did not pull down the shades.

This brief recall cannot do justice to the speaker. His depth of penetration into the profound effects of radiation on psychological and physiological processes can only be appreciated by studying the reports he has published which involve investigations made with many medical schools.

Dr. Ott really set the stage for a meeting concerned with the psychology of color — broadly conceived.

For information on his studies, write to: Dr. John Ott, Environmental Health and Light Research Institute, 1872 Hillview Street, Sarasota, Florida 33579.

R.W.B.

## HELSON ON PLEASANTNESS OF COLOR COMBINATIONS

The highlight of the Tuesday morning meeting, following the business session, was the description by Dr. Harry Helson, University of Massachusetts, of an extensive study carried out by him in collaboration with Theron Lansford at the University of Texas several years ago. Ten observers, five women and five men, with varied ages, outlooks and interests were asked to rate 125 object colors on 25 differently colored backgrounds under 5 different illuminants for pleasantness. The rating scale extended from 1 for very, very unpleasant, through 5 for indifferent, to 9 for very, very pleasant. The object colors (1 by 1-1/2 inches) were viewed 10 to 12 at a time on a large background (17 by 22 inches) and the resulting ratings were averaged to produce 15,625 averages for women, and the same number for men. These averages were subjected to an analysis of variance, and it was found that the pleasantness of color combinations depended significantly on choice of illuminant (incandescent lamp, warm-white fluorescent, cool-white deluxe fluorescent, daylight deluxe fluorescent, Macbeth daylight) for all hue families, and on sex for only one hue family (yellow-red); but in conjunction with choice of illuminant, or choice of background color, sex had a significant influence on pleasant-

ness for 8 or more of the 21 color families. Women rated 23 or more of the 25 background colors higher in pleasantness for object colors of "warm" hues (yellow reds); men preferred "cool" object colors on more than 17 of the 25 background colors. Choice of background color was found to have a much more important influence on the pleasantness of the object color than choice of illuminant, and the most important requirement for a high pleasantness rating was found to be that the background color must be definitely either lighter or darker than the object color. Saturated object colors were found to be slightly preferred over grayish colors. This study gave little support to the "law" of color harmony that a large hue contrast between object and background colors guarantees a pleasant combination. About equal numbers of such combinations were found to be pleasant as unpleasant depending on other factors. The most clear-cut conclusion on the influence of hue on pleasantness to be drawn from the reports of the 10 observers is that object colors whose hues are in the range, yellow to yellow green, receive consistently lower pleasantness ratings than those of other hues. The Helson-Lansford project was supported by the Illuminating Engineering Research Institute, and the report is scheduled to appear in the July 1970 issue of Applied Optics as the featured article.

D. B. Judd

## THE USE OF COLOR IN ART AND SCIENCE

The Symposium on Tuesday afternoon, the second day of the annual ISCC meeting, was opened by the chairman, Dr. Robert W. Burnham. He explained briefly that the aim of the Symposium was to open lines of communication, and attempt to integrate the opinions of the highly varied types of individuals and groups who are interested in color. The program comprised six individuals from different fields. Each had the task of giving a ten minute presentation, outlining the use of color in his particular field, and pointing out how his use of color should be integrated with other disciplines having an interest in color. Then three other individuals had the task of commenting on the six presentations.

The first speaker was Mr. Walter C. Granville, an independent color consultant from Libertyville, Illinois. Mr. Granville spent the first few minutes describing the evolution of the title for the symposium. "The Role of Science in Art and Design" was one of the initial titles and was rejected as being too broad. "Art and Science in the Use of Color" was rejected because it was considered too vague. The title finally selected was a compromise.

Mr. Granville claimed that, although color is used in art, it is not the essence of the work. The essence of art is life and thought which, by way of illustration, come through even in a black and white reproduction. Hence the relationship between art and science is minimal.

A scientific approach to color description is needed in order to sample color space in an orderly fashion. Some examples of systems already in existence to accomplish this task are the Munsell, Ostwald, and Hesselgren systems. The measure of these systems is the degree to which they describe colors for practical use, e.g., fashion. Fashion departs, and should depart, from perceptible differences, but perhaps the measurement of these differences could provide the designer and artist with a prediction of the effects he will produce in a certain situation.

Professor Harry Helson from the University of Massachusetts was the next speaker. He described measurement as the contribution of scientific psychologists to color in art and design. Psychology measures human responses and color is a human response. Professor Helson then proceeded to provide two illustrations of measurements of this kind related to color. The first one concerned the use of the VonBezold spreading effect to measure the relative effects of contrast and assimilation. From these measurements the artist or designer could perhaps understand the impact he is producing with his various contrasting lines, and use this knowledge to produce new emotional reactions. Professor Helson's second example concerned an unpublished study made by him and a colleague in order to compare modern art and classical art for an average impression and to rate for relative importance four basic components of each, color (and texture), space, dynamic quality, and content. In order to determine their relative importance these results were subjected to a multiple regression analysis. The results indicated that, for classical art, content was rated highest, color (and texture) next, dynamic quality third, and space last. For modern art color rated first, space second, dynamic quality next, and content last. These results will not surprise many artists, but the interesting aspect of this study is that the results showed up under systematically controlled conditions. Finally, Professor Helson remarked that fifty years from now the same kind of controlled study can be made and the results could provide us with a quantitative comparison between the attitudes then and now.

Next on the program was Professor Dorothea Jameson Hurvich from the University of Pennsylvania. She said that, considering the complexity of the subject, she could only pass on to us a few of her thoughts. To Professor Hurvich the purpose of the ISCC is to establish a dialogue between

scientists and artists, including designers, engineers, etc. The artist attempts to express, in his chosen medium, something about his environment, while the visual scientist attempts to understand the mechanism behind his perceptions, and to quantify these perceptions. In other words, the artist really wants to control the receiver, while the scientist wants to explain it. Only in the strictest sense does the artist have to know the mechanism of the eye and its relation to his perceptions in order to obtain the desired results. After all, the ancients obtained desired effects without either a Munsell or a CIE system of color specification. Professor Hurvich concluded that an artist's use of color does not require an a-priori knowledge of scientific fact — but a basic knowledge of perceptions would be useful. The visual scientist uses visual receivers to understand something about color, while the artist uses the receivers to show a person something about his environment which he may have missed.

The fourth speaker on the agenda was The Reverend Alfred A. Juliano from the Center for Experimental Automotive Safety Research at Drexel Hill, Pennsylvania. Father Juliano proposed that our purpose is to discover a means of bringing together different systems of thought without destroying their individuality. Nevertheless there is an interdependence among the various forms of thoughts. To the artist, color is the most extensive element, while plastic-form displays the various symbols of our environment. To the scientist color is a response phenomenon to be studied as such. It must be remembered, though, that all analysis and synthesis are human inventions where first images are converted into some expression of form, essence, etc. The work of science is complete when it is applied through artists and designers to make our world a more productive and beautiful place in which to live, thus contributing to the pleasure, convenience, safety, comfort, and general well being of as many individuals as possible. Unfortunately the vast accumulation of technical advancements in the past few decades has not improved our situation. Father Juliano said in conclusion that color remains our link with reality. Art, using color, can be one of the best tools available to science. Art and science can work together to describe and demonstrate worthwhile objectives, and consequently a more perfect method for human interaction.

Mr. Calvin S. McCamy from the National Bureau of Standards in Washington, D.C. proposed that the purpose of color photographs is to try to tell the truth about the colors of our environment. He then reviewed various color systems, including infrared photography, which he described as a hypercolor system. In this kind of system the truth is not revealed about colors. Any three independent

variables, like the three dye layers of a film, may be plotted on a two dimensional surface. Thus five dimensions can be produced, three chromatic and two spatial. There are many applications of the "false" color of hypercolor photography. It can be used to identify crops, plot the various characteristics of seashores, identify various kinds of diseases of fruit trees in the early stages, make geological surveys, etc. False color photography can be and is used by the artist as a medium to provide insight into new artistic methods. This is, then, one example of the contribution of science to art.

The last speaker on the program was Mr. Frank C. Wright from New York City, who represented the American Artists Professional League. He remarked that we obtain tools and gain perspectives from the interaction of artists and scientists. He defined scientific research as the discovery and exploration of facts and details, while development is their application. Caution must be taken, however, to keep our feet on the ground. In other words, vision and the visual arts cannot be divorced from experience and, conversely, experience cannot be divorced from vision or the visual arts.

The one common quality underlying both fine arts and science is imagination. With this in mind Mr. Wright proceeded to develop his "model mountain," at the top of which is truth. The arts, science, metaphysics, whatever, wend various paths up the mountain to obtain this nebulous quality, truth. As these paths approach the top of the mountain they converge, and more meaningful information is then obtained. The limits of our perception and mental capacity to encompass the vast complexities of truth are represented as clouds that may break a bit, and we can obtain some insight into the peak on which truth is located. Unfortunately (and as Plato said — Ed.) this is only a fleeting glimpse and many times the wrong peaks are reached and false impressions of truth are formed. The main point of the illustration, according to Mr. Wright, was to indicate the need for cooperation and interpretation of the arts and sciences in order to obtain knowledge and truth.

Following these six speakers were the three respondents, the first being Mr. C. J. Bartleson, from the research branch of the Kollmorgen Corporation located in Newburgh, New York. He commented that the purpose of science is to make nature more intelligible. In that way there is very little difference between science and art. They are both creative endeavors, based on experience, or as some call it, empiricism. Experience is the crux of both disciplines. To put it another way, statements of observation and attempts to explain them, pervade all of these endeavors to which we

choose to apply the names of science and art. Mr. Bartleson pointed out that these somewhat arbitrary divisions represent lack of communication among the individuals involved, and he provided a simple model to illustrate the problem. The model consisted of three arms located radially around a relatively small central section. At the extreme end of these three arms was a much larger circular area. In the model the central area represented a thought, and each of the extreme areas represented this thought expressed in three languages: English in one, French in another, and German in the third. If an individual were to move from one large area to another, avoiding the central area, then he would have a literal translation from one language to another. He would, consequently, lose the essence of the thought in the process. The solution to the problem would be to travel from one large area (language) to another through the central area, the thought.

The same problem exists in the distinction between art and science. The basic concern of each group is the same, but the recognition of the problem is difficult because they speak different "languages." Therefore, according to Mr. Bartleson, the concern of the ISCC is to avoid "literal translations" and by doing this reach to the crux of the situation, the thought.

Dr. Jo Ann S. Kinney of the U.S. Naval Submarine Medical Center at Groton, Connecticut, was the second respondent. The main theme of her comment was that there is little or no relationship evident between art and science. To support her claim Dr. Kinney contends that there is little experimental psychological evidence to support any lawful relation between color in general and human motivation. An individual's thoughts, motives, emotions, and performance are not influenced by color in any predictable manner. Psychologists have long realized this, and have deferred to designers and others who are interested in the commercial aspects of color to deal with the problem.

The last respondent was Mr. Raymond Spilman, who represented Raymond Spilman Industrial Design in Stamford, Connecticut. Mr. Spilman declared that the majority of designers use color primarily as a psychological tool to manipulate the human environment. The scientist can contribute to the designer and artist by providing them with some means of documenting their color usage accurately, and by providing them with some feeling for the underlying principles of color. Then the designer can apply these principles to accomplish his end. With these mutual interests, artists, designers and scientists will come closer together and perhaps provide some ground for mutual understanding.

In general the symposium was well organized, well presented, well represented, and well received. The speakers and respondents represented a cross section of artists at one extreme, the nebulous middle ground of the practical applicators, to scientists at the other extreme. The interpretation of the title varied considerably from speaker to speaker, and from respondent to respondent and, considering the nature of the subject, could be expected to do so. Some speakers and respondents might be accused of interpreting the title too literally and others too loosely but, instead of detracting from the theme, it served to enhance it because it was a real illustration of the underlying problem, communication and understanding.

These few paragraphs have been an attempt to chronicle the presentations at this symposium. Consequently this review suffers from the same problem that was our theme. Thoughts were represented by spoken words. Interpretations were made by this reviewer, inferences drawn from these words and, subsequently, the inferences were, in turn, represented by these written words. Then these written words will be read, interpreted, and once again inferences will be drawn. If, afterward, various degrees of these kinds of processing occur, and one small amount of mutual understanding evolves, then we will have accomplished something from this year's meeting. Is it not fortunate that those of us who attended the meeting, and those of us who now read this article, use the same language formula? Is it not UNfortunate that we all don't speak the same language?

Ronald F. Witzel (Non-Member)  
Eastman Kodak Company

Editor's Note: This review was requested in order to introduce a promising younger member of the color community who may be expected to contribute significantly in the future.

R.W.B.

#### **MR. RALPH M. EVANS - RETIRING SECRETARY**

At our recent business meeting the Secretary's report was not read, although it will be printed in the minutes. Instead Mr. Evans chose to make a few remarks essentially as follows:

"Since this is my last day in office as your Secretary, I feel that I would be greatly remiss if I did not make a few personal remarks.

"It came as some shock to me the other day to discover that I have been your Secretary for 18

years. I also discovered, however, that in this capacity I had been considerably outdistanced by your Treasurer who has held office for 30 years.

"But at the reception last night I realized that my predecessor, Dorothy Nickerson, had been Secretary for 14 years so by adding our terms together we could outdistance Norman Macbeth.

"While 18 years sounds like a long time, I cannot claim that my task has been an arduous one and there are two good reasons why this is so.

"The first reason is the fact that my own secretary in Rochester, Miss Carol Rowden, who has been with me throughout the 18 years, has been a devoted worker for the Council even though she knows very few of you and has never attended a meeting.

"The second reason is that all of the rest of the work, and I mean all, has been done by George Gardner on whose activities I do not need to elaborate to you. I am delighted that he is to continue as a member of your Board.

"In other words my role as Secretary has been completely that of advisor and I want that clearly understood.

"I should like to add that practically everything I know about the subject of color I have learned through association with one or more members of this Council and that practically all of the people whom I count among my close friends are also members of this Council."

## NEW MEMBERS

The following applications for individual membership were accepted at the meeting of the Board of Directors held in New York City on April 12, 1970.

### Individual Members and their Particular Interests

Mrs. Mary E. Baker 3M Company 235 Library, 235-2D 3M Center St. Paul, Minn. 55101	This library is a potential source of information to its users for any and all aspects of color.
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Dr. K. P. Barr National Lending Library for Science & Technology Boston Spa, Yorkshire England	
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Mr. James M. Berry Teletype Corporation 5555 Touhy Avenue Skokie, Ill. 60076	Additive/subtractive color printing.
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Mrs. Alice E. Bresnahan 3M Company 209 Library, 209-2C 3M Center St. Paul, Minn. 55101	Reading and keeping abreast of new articles and accomplishments in the area of color — to pass this knowledge on to the people in my library who do color research.
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Mr. George Brettell 1614 Hudson St. #217 Redwood City, Ca. 94061	General colorimetry and color order systems.
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Dr. William Carr Geigy (U.K.) Ltd. Pigments Division Roundthorn Estate Wythenshawe Manchester M23 9ND England	Physical properties of pigments and their relationship with the application properties of pigmented systems.
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Mr. Robert W. Chute Chrysler Plastic Products Corp. 3130 W. Monroe St. Sandusky, Ohio 44870	Instrumental color matching and control.
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Mr. E. K. Cooper Canadian Pittsburgh Ind. Ltd. 3730 Lakeshore Blvd. W. Toronto 14, Ontario, Canada	Specifications, colour differences, colour measurement.
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Miss Mary Egan 320-47 Thorncliffe Park Dr. Toronto 354, Ontario Canada	Aesthetics, association, preference, trends. Application in interior and industrial design.
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Mr. Edward Friel 1837 12th Ave. West Seattle, Wash. 98119	Construction of a workable reference system for color. The role of color in the visual process.
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Mr. Lowell W. Gill Ciba Chemical & Dye Company, Route 208 Fair Lawn, N.J. 07410	Color measurement, color difference interpretation, color control and computer color matching.
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Mr. Charles D. Green Celanese Coatings Co. P.O. Box 99035 Louisville, Ky. 40299	Color measurement, analysis, and matching using computer techniques.
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Mr. Norman L. Haldy American Olean Tile Company 1000 Cannon Avenue Lansdale, Pa. 19446	Color matching — shading and application of instrumentation thereto.
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- Mr. Yorick G. Hurd  
L. E. Carpenter Co.  
Design & Roller Div.  
355 Connecticut Ave.  
Norwalk, Conn. 06854
- Color measurement,  
photometry, gloss and  
psychological.
- Mr. Kenneth J. Janson  
Hallmark Cards  
25th & McGee  
Kansas City, Mo. 64141
- Formulation and control  
of printing ink and dyed  
paper stock.
- Mr. Levon  
Kabasakalian  
65 Sun Haven Drive  
New Rochelle, N.Y.  
10801
- The development of a  
theory of color psy-  
chology — influence of  
color on function and/or  
mood — in physical en-  
vironment (as used by  
architects, and interior designers and decorators)  
— color symbolism — the role of color in percep-  
tion (not the mechanism of color perception) —  
color in history and society — analogous experi-  
ence in other sensory modes.
- Mr. Genro Kawakami  
8-8 Tamagawa 1-chome  
Setagaya-ku  
Tokyo 158, Japan
- Mrs. Elizabeth W. Kraus  
Eastman Kodak Company  
Kodak Park Division, Bldg. 59  
Rochester, N.Y. 14650
- Miss Betty Marsh  
Southern Furniture  
Manufacturers Assoc.  
P.O. Box 951  
High Point, N.C. 27261
- Education.
- Mr. Rudolf C. Morvay  
Bell Telephone  
Laboratories  
Mountain Avenue  
Murray Hill, N.J. 07974
- All applications of color  
related to the Bell  
System.
- Mr. Tibor G. Perlus  
Ontario Research  
Foundation  
Sheridan Park,  
Ontario, Canada
- Evaluation of reflected  
colour and colour  
change.
- Mr. Kurt Pfahl  
Hallmark Cards  
25th & McGee  
Kansas City, Mo. 64141
- Graphic Arts (litho and  
gravure) production and  
research.
- Dr. Robert E. Pollack  
Dept. of Pathology  
New York University Medical Center  
550 First Avenue  
New York, N.Y. 10016
- Physiology, perception.
- Mr. David W. Reiersen  
Staley/Graphics  
P.O. Box 645  
Columbus, Ohio  
43216
- Strength determination of  
transparent colorant  
layers on diffuse reflec-  
ting surfaces. Also color  
matching and tone repro-  
duction in halftone print-  
ing and continuous tone printing processes.
- Dr. Walter Schramm  
J. R. Geigy S.A.  
Central Research  
Scient. Doc./Central  
Library 31.51  
CH-4000, Basle 21, Switzerland
- Application and research  
of color for textiles,  
paints, plastics, fibers.
- Mr. Fay Spears, Jr.  
Hooker Chem.  
Durez Div.  
N. Tonawanda, N.Y. 14120
- Color matching, dyes and  
pigments.
- Mr. Jay D. Tebo  
Xerox Corporation  
P.O. Box 305  
Webster, N.Y. 14580
- Color research and color  
bibliography.
- Miss Mae S. Tucker  
Public Library  
310 N. Tryon St.  
Charlotte, N.C. 28202
- Textile-related, dyeing,  
etc.
- Mrs. Nancy Walker  
740 N. Rush St.  
Chicago, Ill. 60611
- Styling home furnishings  
and apparel.
- Mr. Irwin Wunderman  
Cintra Inc.  
440 Logue Ave.  
Mountain View, Ca.  
94040
- Quantitative measurement  
techniques for describing,  
monitoring, and measur-  
ing color. Photometry and  
radiometry. Digital in-  
strumentation techniques  
as applied to automating color measurements.
- OLD NEWS — FROM ISCC NEWS LETTER  
NO. 2 (1933)
- W. E. Baier, Research Dept., California Fruit  
Growers Exchange
- The California citrus industry has used as legal  
criteria of maturity of oranges and of grapefruit a  
specification of color of the outside surface of  
these fruits at the time of packing. In the past the  
designation used has been so called percentage of  
color. Anticipating that such a loose description of  
color might sometime be a point of contention in  
legal proceedings, steps have been taken to arrive  
at a more exact color definition to be incorporated  
into the State Law.
- The State Department of Agriculture with the aid  
of the U.S. Department of Agriculture Laboratory

of Fruit & Vegetable Chemistry, which latter has in use a Keuffel & Esser instrument after the Munsell system, has arrived at the definitions of the old established "per cent colors" which we quote from the Standardization Act as follows: —

#### "Color Definition.

"'Twenty-five per cent of characteristic color' in the case of oranges is defined as that color designated by the Munsell color notation as hue (four) one and fourteen hundredths green-yellow, value (four) five and twenty-three hundredths, chroma (three, (4GY4/3),) four and three-tenths (1.14GY5.23/4.3) and 'seventy per cent colored' as hue three yellow, value six, chroma five, (3Y6/5). Oranges shall be considered as having exceeded twenty-five or seventy per cent color if the average hue of the surface of each fruit is numerically less than (four) 1.14 green-yellow or three yellow respectively, regardless of the other components of the color.

"'Twenty-five per cent characteristic color' in the cases of grapefruit is defined as that color designated by the Munsell color notation as hue (ten yellow) three and three hundredths green-yellow, value (five) five and sixty one hundredths, chroma (three, (10Y5/3),) four and nine-tenths, (3.03GY5.61/4.9), and 'seventy per cent colored' as hue seven yellow, value seven, chroma six (7Y7/6). Grapefruit shall be considered as having exceeded twenty-five or seventy per cent color if the average hue of the surface of each fruit is numerically less than (ten) 3.03 green-yellow and seven yellow respectively, regardless of the other components of the color."

Editor's Note: I wonder how they do it today, 37 years later.

#### OFFICIAL SHOE LEATHER COLOR STANDARDS SPRING AND SUMMER 1971 ISSUED BY THE COLORS COMMITTEE OF THE TANNERS' COUNCIL OF AMERICA INC.

At its concluding session January 22 the Colors Committee approved a dramatic and vital set of leather colors for Spring and Summer 1971, selected for shoes and accessories. A new color direction was charted both for women's and men's shoes, a direction which holds the promise of being a tremendous merchandising stimulus. It reflects the trend to leather colors of true "leathery" character in ranges lighter and more saturated, to serve as strong accents.

Two objectives were met by the Committee. First, to select official color standards at an early

enough date to give reliable guidance to manufacturers and retailers. Second, to make certain that the leather colors selected would enhance consumer appeal of shoes and accessories in every category. The Committee took cognizance of problems created by style uncertainties and therefore determined to project a positive and authoritative color picture for Spring and Summer 1971.

Two Official Books, Women's and Girls,' and Men's and Boys,' will be printed in a new format for Spring and Summer 1971. This should be even more useful than previous books and give practical assistance in the development of shoe lines as well as in planning promotions. The books, now being printed, will be offered to the trade at cost. As always the edition is limited and you are urged to place orders promptly. Each book is offered at \$7.50 per copy. (\$15.00 for the set of two books.)

Write: Tanners' Council of America, Inc., Color Bureau, 411 Fifth Avenue, New York, N.Y. 10016.

#### Official Color Standards — Spring and Summer 1971 Men's and Boys'

##### Gleaming New Textures & Finishes

Marron	Russet
Carnaby	Antiqued Tan
Spectrum	Antiqued Burgundy — Continued
Puma	Dark Copper Brown
Black Cherry	Dark Black Cherry
Florentine Tan	Pattern Brush Technique
Black Ice	Antiqued Silver

##### Red Tones

Apple Wood	Light Cinnamon
Provence Tile	Brick
Red Pepper	Mahogany
Molten Brown	Reddish Brown — Continued
Tansin	Dark Mahogany

##### Town & Travel

Sycamore	Medium Tan
Bronze Nugget	Copper Tan
Antiqued Maple	Golden Brown
British Tan	Saddle — Continued

##### Country & Suburban (Brushed Leather)

Stormy Seas	Dusty Blue
Clay Pigeon	Dusty Brick
Brittle Brown	Golden Reddish Tan
Wallaby Tan	Neutral Tan

## White

White Bark  
Silver Fizz

Lively White  
Antiqued White

## Summer Lights for Brushing

Coffee Cream  
Vicuna

Light Beige  
Warm Beige

## Contemporary

Burnt Thistle  
Burnt Beech  
British Gold  
Filtered Brass  
Tomino  
Stone Fly

Deep Golden Tan  
Golden Tan  
Medium Golden Tan  
Medium Brassy Brown  
Dark Reddish Brown  
Medium Brown Grey

## Official Color Standards – Spring and Summer 1971 Women's and Girls'

### Classics

Black Patent  
White Tailgator  
Marine Blue  
Teak  
Lipstick

Shiny  
Shiny & Textured  
Lighter than Navy  
Wood Color – No Red  
Deep and Rich

### Pottery Tones

Ceramic Blue  
Tea House  
Silver (Metallic)  
Tiffan Tan  
Taupe

Used in Far Eastern  
Crafts  
A young Green – No  
Yellow  
Answer to Grey – the  
Summer "Wet Look"  
A Clay Color – No Red  
Pale Ceramic Tone

### Body Tones

Ivory  
Butterscotch  
Honey Blonde  
Sandalwood

Jasmine Nakedness  
Sunny with Cosmetic  
Undertone  
A Natural Tan Shade  
A Dark Suntan Shade

### Underwater Colors

Parrot  
Mauve Pink  
Aqua  
Orange Coral }  
Pink Coral }  
Butterfly Blue

Chartreuse of Oriental  
Prints  
Pink influenced by Blue  
Greenish Aquamarine  
Two Kimona Color  
Accents  
Exciting new Blue

Jade

Most popular version of  
Jade today

Violet

To be worn with White

Delegate Ruth H. K. Fries  
Tanners' Council of America Inc.

## STANDARDS FOR ACRYLIC PAINTS

Frank C. Wright, President of AAPL, writes that "We have officially requested the U.S. Bureau of Standards to set up quality standards for acrylic paints. Ken Kelly and other officials there have indicated that this would be a valuable and timely contribution. It would greatly enhance the motivation if everyone interested in quality standards for acrylics writes to the Bureau and backs up the request. Acrylics are growing so fast that something must be done about their standards."

## A COLOR EXPERIMENT BY BENJAMIN FRANKLIN

The following item, which came to light during a recent re-reading of Carl VanDoren's "Benjamin Franklin," may be of interest to News Letter readers for it may record the first experiment of its kind. At any rate it recalls for us the very wide range of Franklin's interests – up to, and including color!

In May of 1760 a correspondence was begun with young Mary (Polly) Stevenson, at her request, on the subject of natural philosophy. Of all the matters discussed with her in his letters, one of the most original was Franklin's experiment to test the effect of the sun's rays on clothing.

"Since I cannot find the notes of my experiment to send you I must give it as well as I can from memory . . . I took a number of square pieces of broadcloth from a tailor's pattern card, of various colours. There were black, deep blue, lighter blue, green, purple, red, yellow, white, and other colours or shades of colours. I laid them all out upon the snow on a bright sunshiny morning. In a few hours (I cannot now be exact as to the time) the black, being warmed most by the sun, was sunk so low as to be below the stroke of the sun's rays; the dark blue almost as low, the lighter blue not quite so much as the dark, the other colours less as they were lighter; and the quite white remained on the surface of the snow, not having entered it at all.

"What signifies philosophy that does not apply to some use? May we not learn from hence that black clothes are not so fit to wear in a hot sunny climate or season as white ones? . . . That soldiers and seamen, who must march and labour

in the sun, should in the East or West Indies have a uniform of white. That summer hats, for men or women, should be white, as repelling the heat ..."

Dorothy Nickerson

## OUR RED, WHITE, BLUE GAL

Carolyn King, wife of America's personal ambassador to Japan's Expo '70, John M. King of Denver, is planning to convey a true American image abroad. She picked a Steuben glass figurine of an eagle as her gift for important people, and for her wardrobe, she chose American designers' clothes — in red, white and blue.

**HENRY HEMMENDINGER**

announces the opening of a new laboratory for

**COLOR MEASUREMENTS AND SPECTROPHOTOMETRY**

and for consultation on their applications  
to color specification and color control

HENRY HEMMENDINGER  
R. D., Pequest Bend  
Belvidere, N. J. 07823

Tel 201-475-2123

## A NEW FIBRE OPTICS COLORIMETER

The British Paint Research Association at Teddington who a few months ago announced their Conductive Paints and "paint-on central heating," now moving rapidly towards commercial exploitation, has been active in many other fields.

The latest development is a Fibre Optics Colorimeter, which was designed specifically for measuring color during paint manufacture but is adaptable for production control in many other color-based industries. This extremely accurate tristimulus colorimeter is expected to be of immediate interest to scientific instrument manufacturers.

Other high precision colorimeters require the material under test to be presented to an illuminated porthole on the meter, which is usually in a fixed position. The Paint Research Association faced with the requirement to measure color in a bulk paint container has utilized fibre optic light pipes to separate a small viewing probe from the bulk of the apparatus, which includes light source, stabilizer, filter unit, photomultiplier, amplifier and meter. These light pipes, similar to those used by surgeons for observation deep inside human bodies, can carry illuminating beams and

return reflected light distances of several yards, without significant loss in intensity. The fibre optics assembly can be encased in a plastic sheath terminating in a glass or plastic window so that the probe can be immersed in water, paint or other liquid without damage. Temperatures of use are limited only by the properties of the optical cements used in the fibre optics. The upper limit is about 60°C with the present apparatus but in any case it is well to avoid measurements at high and uncontrolled temperatures which may materially change the color of many materials.

The design can be varied to suit individual applications. The preferred arrangement for paint testing is a central illuminating fibre bundle surrounded by six viewing bundles picking up the light reflected around a 45°C cone. The use of six fibre optics all viewing the same illuminated spot results in great flexibility in the choice of filters to modify the color sensitivity of the colorimeter. Indeed it is believed that the arrangement will enable any significant "color blindness" to be avoided in the colorimeter, something that has never before been achieved in a photoelectric colorimeter.

The colorimeter has been developed for the paint industry, the ultimate aim being automated control of tinting processes. However, the Research Association believes that the invention, now covered by a patent application, could be used with advantage in many other industries and will be interested to discuss other applications.

The particular advantages claimed for the colorimeter are: —

- (1) The probe can be taken to any part of a process tank or coated surface.
- (2) It can be traversed, if necessary continuously, in order to sample or average the color across a surface.
- (3) It can be modified, by optical filters, to record reflection or absorption in specific wavebands or to measure color on the C.I.E. tristimulus system.
- (4) By addition of a white reflecting panel at a fixed distance from the probe the optical absorption of solutions can be monitored.
- (5) By comparison with present standards, automatic correction of batch colors or continuous processing can be controlled from the output of the colorimeter.

Dr. G. de W. Anderson  
The Research Association of British Paint Colour  
& Varnish Manufacturers



## APPEAL TO EYE CITED IN COURTHOUSE COSTS

Albert Halse believes that it doesn't cost any more to make something attractive than it does to clash with the eye.

Halse is the interior designer and color consultant to Morris County, New Jersey, retained to advise on color combinations and furnishings for the Morris County Courthouse addition.

He drew up specifications for bids for the furniture, colonial reproductions, desks, fixtures, items for judges chambers, that drew responses from 11 firms, with the costs exceeding \$225,000. But he defends the expense, "You have to pay more for furnishings for a building used by the public, the pieces have to hold up under more traffic and wear, and you cannot reduce the quality."

A registered architect, Halse, who lives in Hackensack, is an associate professor of architecture at Columbia University School of Architecture.

### Williamsburg Influence

"I have tried to carry out the Williamsburg message in color in the courthouse," he explained. The colors have been documented by him in trips to the restored village in Virginia to examine their combinations.

"If each department head were left to decide his individual color scheme, he would naturally paint the walls his favorite color which would produce complete disorder," Halse continued, "the correct improves morale, it costs no more."

The dapper, 57-year old designer approached the assignment with the philosophy that the eye demands all colors. "We are uncomfortable with monotony such as institutional green. The design of the building should be a container for color rather than an entity in itself, and the color should compliment people to make people want to stay."

The ribbons of color that will speak to visitors in the courthouse addition will vary with interior walls, woodwork and lobbies, done in such subtle combinations as lime white and blue willow.

The decorator is a trim, well dressed man with an eye for detail. He also has the final word on this project.

### Office Rules

For example, county employees are forbidden to hang anything on walls near their desks except an

approved county calendar, an edict which has prompted some discussion.

The decorator also considers office coffeemakers to be a jarring note in the harmony of courthouse decor. They are not permitted.

Some critics maintain that painting contractors have spent more time mixing paint to achieve the exact color specified than they have putting it on the walls.

A department head, who has had exchanges with the decorator, pointed out that department heads desks are of a standard type but because of special leg carvings, they are required to be custom made at a high price.

But perhaps the biggest controversy comes from the public on cost. Halse receives a \$3,000 annual retainer. He will charge 7 per cent of the total price of bids on the furnishings, which will amount to more than \$17,500. He has also designed the jail chapel, the new Morris County Library interior, the Youth House and other projects.

Supporters claim the designer's work speaks for itself in the attractiveness of the buildings. "At least we don't have gaudy, heavy marble tables like some of the other county courthouses in the state," one woman observed.

### Other Projects

Halse was originally hired in 1956 to assist with remodeling the county's buildings. He was later retained to do interior work in the early 1960's for the Dover Town Hall.

The Morris County Courthouse, Halse said, is his favorite job and he regards Superior Court Judge Alexander P. Waugh's courtroom as "one of the finest rooms I have ever seen from an architectural viewpoint. It has the greatest dignity of any room I know." The courthouse, in shades of palace ballroom blue, is the original courthouse constructed in 1837.

For the 1970's, Halse sees a more color conscious approach to living and an increase in the popularity of orange. The public's taste is improving, he said.

He said homeowners make mistakes when they buy by impulse and fail to get professional help. "People buy something like carpeting they like or a lamp, or a sofa and they don't consider the total setting."

Although he prefers contemporary furniture, he finds that antiques are perfect for enriching modern furnishings. His own office suite in the White Hall building, 280 Prospect St., Hackensack,



is decorated simply in warm yellows, off-white, and pumpkin with touches of objects d'art brought back from trips to the Orient.

Halse is a graduate of New York University. He earned a doctorate in education in 1952 and has been in private design practice for 23 years. His specialties are descriptive analysis of historic buildings and advanced architectural presentations. He is the author of "The Use of Color in Interiors" and "Architectural Renderings."

Active in professional associations, he is a former chairman of the board of the New York chapter, American Institute of Interior Designers and representative for New Jersey.

He also held several offices with the Architectural League, northern New Jersey chapter, and is a member of the New Jersey Society of Architects, and the Society of Architectural Historians.

Valerie Barnes  
From Newark Evening News, March 12, 1970

#### **ASTM SYMPOSIUM, TORONTO, JUNE 24, 1970**

ASTM Committee E-12 on the Appearance of Materials is presenting a symposium with round-table discussions to follow on the subject, "New Frontiers in the Measurement of the Appearance of Materials." This is to be given on June 25 at the annual meeting of ASTM to be held in Toronto, Canada. Richard S. Hunter of the Hunter Associates Laboratory, Fairfax, Virginia, and Harry K. Hammond of the National Bureau of Standards, Washington, D.C., are co-chairmen of the symposium.

The feature paper of the program is to be given by Dr. L. F. C. Friele of the Fiber Research Institute TNO, Delft, Holland. The subject of this paper is to be "Color Difference and Color Tolerance Evaluation: Problems and Outlook." Dr. Friele is noted for the startling new proposals he has developed by bringing considerations of the Mueller Theory of Color Vision to the science of color measurement.

Other papers on the symposium will deal with trends and the expected future of education, instrumental techniques, materials standards, and the use of electronics in appearance measurements of materials.

A round-table discussion of these subjects in the afternoon will be lead by the authors of the papers and by other leading authorities.

#### **Speakers**

W. N. Hale — Future Developments in the use of Visual Color Standards in Color Quality Control Work

Ruth Johnston and George Defresse — Gonio-colorimetric measurements

E. I. Stearns — The Future Role of the Computer in Appearance Evaluation

Henry Hemmendinger, Laurence W. Engdahl and Leroy C. C. Noyes — The Colors of Fluorescent Materials in Various Sources

Fred Simon — Teaching Color Science to Undergraduates, Graduates, and Post-Graduates

L. F. C. Friele — Color Difference and Color Tolerance Evaluation: Problems and Outlook

#### **FROM THE COLOUR GROUP**

##### Wanted

A Hilger and Watts J 40 Colourmeter. Any condition considered. If you or your company have one for sale, please contact Dorothy Morley, Metal Box Co. Ltd., Research Department, Kendal Avenue, Acton, London, W. 3.

##### Visual Colorimeter

At a course for Building Science Teachers held recently at Borough Polytechnic, interest was shown in a visual colorimeter using three calibrated coloured fluorescent tubes to match a white fluorescent tube. This instrument was based on a design by W. Harrison and is useful for teaching and demonstration purposes. There is a small firm interested in marketing this instrument at a price of £ 98 in the U.K. Further details can be obtained from Mr. J. Pickup, Borough Polytechnic, Borough Road, London, S.E.1.

##### Laboratory Gravure Proofer

A laboratory gravure proofer has been introduced by the R. K. Chemical Company Limited, South View Laboratories, Litlington, Royston, Herts. An impression roller carrying the material(s) on which a print is desired is mounted on a carriage which also carries a doctor blade. This carriage is made to traverse a flat, etched gravure plate. Advantages over rotary gravure proofers are claimed to be that sheet materials can be used, and that side by side comparison of inks or materials can be made.

## COLOUR GROUP (GREAT BRITAIN)

Report of the Sixty-sixth Science Meeting held on February 4th at Imperial College

This was a discussion on "Colour in Situ," introduced by Miss A. M. Mitchell and four speakers whose business is in the use of colour in everyday life.

Miss Psyche Pirie spoke first, from her experience as Editor of "Homes and Gardens." As this journal is written for the general reader, being a non-specialist magazine with a readership of over two million, she supposed that she was to represent the views of the man and woman in the street. There was always the danger of exclusivity in any group, and certainly among artists and designers, so that they have to avoid a "them and us" attitude, blaming a philistine public for a lack of appreciation.

Her magazine gives advice to readers on their colour schemes; an extraordinary degree of faith is shown in this advice from "experts." Letters from readers show a great wish to know about colour and also a general lack of confidence in the writers' own judgment. It was surprising how few people seem to have been taught how to look at colour. Designers were probably responsible for the considerable changes in the choice of fabrics and carpets in the last ten years. In her many visits to houses all over the country, she had been struck by the feeling for colour, texture and form shown in the gardens and clothes, and yet this was somehow often lost in the design of the houses themselves.

Mrs. Pauline Brooks, an architect in the Interior Design section of the Ministry of Public Buildings and Works, was full of enthusiasm for colour. Rules, she felt, are not applicable and anything goes. By contrast, modern architecture is dismal and cities have lost their colour. Even the cave-men painted their homes; colouring is so fundamental to us.

The psychology of colour can be used to provide restful colours in the offices of busy, perhaps tense, people. In the design for a hospital for the criminally insane she had used violent colours to match the need of the violent inmates for sensation. In spite of the scepticism of the staff, this seems to have had good effects. Perhaps this is the same need for sensation looked for by those who take LSD and the current mode for loud sounds and extravagant colouring in entertainment.

Mr. M. J. Thomas is concerned with the designs of hotels and bars. His work divides into three areas requiring different treatments — restaurants, bars and bedrooms. Hotels have to sell

their wares (in their case, space) and so some functional lines are set down. Since the main rooms are quite different to the home comparisons are difficult but bedroom designs are more easily compared, and enquiries are often received about them.

His recent experience was that contrasting schemes were preferred, against his clients' expectations. Artificial lighting was usually more often seen than daylight, and was the primary consideration in bars, where the design was often like a stage set. Natural materials were used to give the effect of solidity, and the off-white "age" effects could make it hard to see that a new decor had been finished! There was little real knowledge of customers preferences except that the effect should be restful, in which the designer can give the pleasure possible by the use of colour.

Mr. Derek Phillips divided his contribution on the lighting and colour aspects of design between what was seen in architects' own offices and homes and in their work for clients. They seem to be shy of using colour on their own ground and avoid it with white walls and natural materials. Bright colours are used to show the function of part of the building, or as an integrating factor to show the structure. He showed a series of slides illustrating these points in his own home as well as in other buildings.

In the general discussion which occupied the second half of the meeting, the ideas of changing lighting conditions, at rates which might be very slow, were stated by several speakers. One new art gallery was put forward as an example of how not to arrange for a flexible lighting system. An industrial designer who found his client's managers imposing their own ideas (having already admitted their ignorance) was advised to give them less choice in the design offered, and to have his fun at their expense as this seemed to be normal practice — but was it fair?

One speaker looked forward to quite new possibilities in material surfaces, stressing that light and colour cannot be divorced. The question of education in colour was raised in several ways although it was not certain what form this should take, or for whom it should be. Those over thirty were suggested to be in more need, and the retailers should be able to help their customers make reasonable choices.

Colour scheme problems were solved by fifty per cent common sense and fifty per cent technical know-how. Colour is all around us, like the air, and we need one as much as the other.

## REPORT OF THE 67TH SCIENCE MEETING HELD ON MARCH 4TH AT IMPERIAL COLLEGE

The lecture was slanted towards the reflectance of paint coatings. Interest in this topic arose from a widespread desire, in industry, to predict the colour of a mixture of pigment dispersions instead of finding out by trial and error. Only fully opaque turbid media were discussed.

All turbid medium theories deal with a continuum, since there are far too many particles to treat separately. Any continuum theory is strictly only relevant to uniform dispersions at low volume concentrations, and its use in more awkward practical conditions must be based on experimental evidence.

In practice, the colour of a paint coating varies somewhat with gloss as well as with pigment dispersion, but it seems better to make separate allowances for such factors and not to mix them in with a turbid optics model which should give the right answers in near-ideal conditions. Even for ideal dispersions at low volume concentrations, it is still very difficult to calculate accurately the amount and direction of light reflected and transmitted by turbid media of various brightnesses and thicknesses. The exact equation of radiative transfer is easy to write down, but there are no useful algebraic-solutions, and numerical solutions usually require much computation.

For this reason, a variety of approximate turbid medium theories has been put forward, dating from Schuster's two-flux theory of 1905. In 1916, Schwarzschild showed that Schuster's equations could be derived from a very crude approximation to the radiative transfer equation, and in 1926 Eddington obtained better approximations for the diffusion domain.

From 1930 onwards, a crop of two-flux theories originated from industrial scientists; this includes the theory of Kubelka and Munk, which is probably the only turbid medium theory known to most people concerned with colorant formulation. This theory works tolerably well for diffusing samples, but fails rather badly for very dark or translucent colours, where diffusion is weak. Furthermore, this theory tells us nothing about directional reflectance, and the "constants"  $K$  and  $S$  are merely parameters that are adjusted to fit the data of most interest. Other theories in this crop were embellished with additional constants of doubtful value or meaning.

In this lecture it was shown how the Kubelka and Munk result can be obtained very simply from one-dimensional isotropic diffusion theory, as well as from Stokes' parallel-plate formula and

also from the radiative transfer equation. It was also shown that a simple, useful, result can be obtained from 3-dimensional isotropic diffusion theory, which corresponds to Eddington's approximation for parallel incident light. Numerical comparisons between these two theories were made on reflectance data obtained by Giovanelli (Optica Acta, Dec 1955) using radiative transfer theory. These data were taken to represent a perfect black/white mixture, with the absorption coefficient of the black regarded as an adjustable parameter. Least squares fitting to the reflectances gave the result that isotropic diffusion theory was more precise on the isotropic data (maximum difference 0.3% compared with 0.9%) but less precise for the phase function.

The reason for the indifferent performance of both theories when applied to a set of reflectances ranging from 1% to 90% was most probably due to the fact that they were both diffusion-type theories; whereas when the reflectance was less than about 5% diffusion played a very small part, and the reflectance was due largely to single scatter, for which a totally different equation was required. Results from exact asymptotic formulae for the light and dark (isotropic) cases were shown, from which it was clear that the diffusion-type formula covered a wider reflectance range. Finally, the importance of allowing for surface reflection was mentioned, and attention was drawn to an experimental method for measuring the internal reflection coefficient (Kottler, J. Opt. Soc. Am., May 1960).

## CONFERENCE ON ILLUMINATION

The Hungarian Electrotechnical Association and the University of Technical Sciences in Budapest in cooperation with the Hungarian Committees of the CIE and the AIC, as well as with the Scientific Society for Building and the Society for Optics, Acoustics and Filmtechnics, has organized a conference having the title "LIGHT AND COLOUR IN HUMAN LIFE."

Date of the Conference: 29 September-2 October 1970.

Place of the Conference: Hungarian Academy of Sciences in Budapest, I. Országház u. 28.

Organizing Committee and Secretariat of the Conference: Hungarian Electrotechnical Association, Budapest, V., Szabadság tér 17. Phone: 126-313.

With the exception of the opening and closing speeches the conference will be held in two sections on illumination and color psychology. An exhibition will be organized showing scientific

and documentary material in connection with the subject of the lectures. During the conference a special program will be organized for the relatives of the foreign participants. If there are enough applicants, theater-going, a social program and excursions will also be organized for the participants.

## REMOTE COLOR MATCHING

"SCIENTIFIC COLOR MATCHING" was the subject of a two day course recently conducted in the Boston area by DIANO CORPORATION of Norwood, Massachusetts. A portable terminal connected to a General Electric Time Sharing computer was used in the course to select the proper dyes, compute the amount of each dye needed, determine the cost of the dye formula, and to indicate the quality of the color match under various light sources. A spectrophotometer was used to measure the light reflected from the sample in each portion of the color spectrum and this data was then relayed over a standard telephone line to a large digital computer in Teaneck, New Jersey, and used by the computer to match the color.

## YOUR CAR COLOR AND YOUR PERSONALITY!

The color of the car you buy is determined by your psyche. Different types of people prefer different colors.

Here is a color preference survey:

**Green:** For adventurous, fresh, young, vital citizens. They enjoy the outdoor life and have a pioneer spirit, being full of life and vigor. Enjoy people and small talk.

**Red:** For those who enjoy living, loving, and laughing. It's a fundamental and warm color, appealing to fundamentally warm people. It connotes fire and enthusiasm.

**White:** For attractive and artistic people, who like pretty things and feel they themselves are good to look at. Doesn't distract from a focal point. A person sitting in a white car is very noticeable.

**Black:** Indicates substantial, sturdy disposition, people who disdain show and display, yet discreet and modest, and look to the better things of life.

**Blue:** The more quiet, reserved, even-tempered, reliable, traditionally kind to strangers and loyal to friends. They are not out-in-front people, nor are they pulling up the rear.

**Brown or Tan:** Cordial, deep-thinking folks, neighborly and well-meaning.

Actually, color preferences go in cycles. There was a time when it was difficult to sell green-colored cards. This was after World War II, when people were tired of anything close to khaki in color. Car buyers wanted something totally different, so they switched to red, and then the preference turned to white. Blue has never been a leader, but always a contender. The current trend is strong to black, but the cycle has turned to green, and this is now one of the most popular colors.

From the Farmers Almanac

## INDEX

For last Index see No. 197, Nov.-Dec. 1968.

No. 198 (January-February 1969)

1969 Annual Meeting  
New Members  
Award to Jo Ann Kinney  
John Yeatman, Director USDA Laboratory  
ISCC Conference on Perception  
ISCC Color Information Bureau  
Liaison Among Members  
Color Marketing Group Activities  
Federation of Societies for Paint Technology  
Annual Meeting  
Package Designers Council Seminars  
Society of Plastics Engineers Conference  
Technical Association of the Pulp and Paper Industry Standards  
Problem 18: Current Status  
The Colour Group (Great Britain)  
ISCC - Colour Group Meeting  
Frieling Books on Color  
Textile Chemist and Colorist, new journal  
More on Krómskóp  
Kollmorgen Spectrophotometer  
Board of Directors Report on Meetings  
Miscellany  
Color Bibliography

No. 199 (March-April 1969)

Annual Meeting Issue

General Report on 1969 Meeting  
Godlove Award to Harry Helson  
Citation by D. B. Judd  
Helson Publications  
President's Report - F. W. Billmeyer, Jr.  
New Members  
Secretary's Report - R. M. Evans  
Treasurer's Report - N. Macbeth  
Finance Committee's Report - N. Macbeth

## Color Information Bureau

News Letter Editor's Report — R. M. Hanes  
Report on Member Body Liaison — R. M. Hanes  
Report on Individual Member Liaison — W. N. Hale  
Membership Committee Report — W. C. Granville  
Problems Committee Report — R. E. Derby, Jr.  
Problem 7 — Survey of Color Specifications — R. F. Hoban, Chairman  
Problem 14 — The Colorimetry of Transparent Materials — W. B. Reed, Chairman  
Problem 16 — Standard Methods for Mounting Textile Samples for Colorimetric Measurement — W. L. Matthews, Chairman  
Problem 18 — Colorimetry of Fluorescent Materials — F. Grum, Chairman  
Problem 21 — Standard Practice for Visual Examination of Small Color Differences — S. Huey, Chairman  
Problem 24 — Color Measuring Instruments: A Guide to their Selection — Ruth M. Johnston, Chairman  
Problem 27 — Metamerism Index — I. Nimeroff, Chairman  
Problem 30 — Color in the Building Industry — M. D. Folley, Chairman  
Reports by Chairmen of Delegates of Member Groups  
American Artists Professional League — F. C. Wright  
American Institute of Architects — W. Faulkner  
American Oil Chemists Society — W. L. St. John  
American Psychological Association — Jo Ann S. Kinney  
American Society of Photogrammetry — J. T. Smith  
Color Marketing Group — L. A. Graham  
Dry Color Manufacturers' Association — R. Thornton  
Federation of Societies for Paint Technology — Ruth M. Johnston  
Graphic Arts Technical Foundation — F. L. Cox  
Gravure Technical Association — O. Smill  
Illuminating Engineering Society — N. Macbeth  
Industrial Designers Society — R. Spilman  
Institute of Food Technologists — G. MacKinney  
National Association of Printing Ink Makers — F. L. Wurzburg  
National Paint, Varnish and Lacquer Association — E. R. Call  
National Society of Interior Designers — Dede Draper  
Optical Society of America — Dorothy Nickerson  
Package Designers Council — K. Fink  
Paperboard Packaging Council — W. B. Leavens, Jr.  
Society of Motion Picture and Television Engineers — R. M. Evans  
Society of Photographic Scientists and Engineers — A. J. Derr  
Society of Plastics Engineers — M. M. Gerson  
Technical Association of the Graphic Arts — H. B.

## Archer

Preliminary Program of the International Color Association  
Joint Meeting — ISCC and the Colour Group  
ASP-SPSE Joint Seminar  
Exhibition — New York Guild of Handweavers  
Summer Program — RPI — Color Technology  
Short Course — Food Colorimetry

No. 200 (May-June 1969)

Impressions — First AIC Congress — D. B. Judd, J. T. Smith  
S. Leonard Davidson — President-Elect of FSPT  
Richard S. Hunter — TAPPI Award  
Herbert Livesey — NAPIM Ault Award  
Paul J. Papillo — Director Pigments Dept., Geigy Chemical  
Edwin L. Stearns — Research Associate, American Cyanamid  
Necrology — Karl Freund  
Smithsonian Gets Pioneer Color TV  
Report — Problem 22, J. T. Atkins  
Additional Member-Body Reports  
American Association of Textile Chemists and Colorists — R. F. Hoban  
American Society of Photogrammetry — C. L. Norton  
American Society for Testing and Materials — G. W. Ingle  
Society of Plastics Engineers — H. M. Gerson  
Book Review — The Use of Color in Interiors — A. O. Halse, by A. F. Styne  
ASTM Recommendation on Fluorescent Whitening Agents  
Position Openings — Dept. of Agriculture  
CMG Meeting — Miami  
The Colour Council of Canada  
British IES — New Journal  
New News Letter on Color and Design  
A Word for the Greeks  
The Penultimate Phase of the Color Explosion  
Australian Alice  
As We See It  
Greek Power in Salt Lake  
Reprint — Wyszecki  
Color Bibliography

No. 201 (July-August 1969)

Color Definitions: 17th Century Style  
Colour Defectives as Art Students  
Additional Annual Report  
Industrial Designers Society of America — R. Spilman  
Letters to the Editor  
CMG Fall Meeting  
Student Seminar  
Color Marketing Group — Speakers Bureau  
FSPT Annual Meeting  
GATF Seminars — Color and Color Reproductions  
IFT News



TAPPI Optical Methods Committee Meeting  
Lovibond of America Inc.  
The Colour Group (Great Britain)  
Soviet Colorimetric Standards  
New Books  
Human Color Perception — J. J. Sheppard, Jr.  
Light, Colour and Vision — Y. LeGrand  
Research — Istituto Nazionale di Ottica  
Couleurs  
Color Glazing Concrete on the Job  
Miscellany  
Reprint — Evans and Swenholt  
Color Bibliography

No. 202 (September-October 1969)

R. W. Burnham to Edit News Letter  
Election of Officers and Directors  
New Members  
Annual Meeting Theme: Psychology of Color  
Armin J. Bruning Award — S. L. Davidson  
ISCC Williamsburg Conference on the Optimum  
Reproduction of Color  
NPVLA — Color Forum  
OSA — 1969 Meeting Papers  
The Colour Group (Great Britain)  
Joint Meeting — ISCC and The Colour Group  
Book Reviews  
The American Heritage Dictionary — Dorothy  
Nickerson  
Trilogy — Birren — Dorothy Nickerson  
Miscellany  
Color Bibliography

No. 203 (November-December 1969)

Annual Meeting Symposium  
Joint Bibliography — ISCC and Colour Group  
The Colour Group (Great Britain)  
Book Reviews  
J. J. Sheppard, Jr. — Human Color Perception, by  
R. M. Evans, by L. M. Hurvich and Dorothea  
Jameson, by Jo Ann S. Kinney, and by I. Nimeroff  
Miscellany  
Color Bibliography

#### PUBLICATIONS COMMITTEE

Robert W. Burnham, Chairman  
Deane B. Judd  
William J. Kiernan  
Dorothy Nickerson

Send News Letter Items to Editor:

Dr. Robert W. Burnham  
Eastman Kodak Company  
Research Laboratories, Bldg. 81  
Rochester, N.Y. 14650

Other Correspondence to Secretary:

Dr. Fred W. Billmeyer, Jr.  
2121 Union Street  
Schenectady, N.Y. 12309