

# Inter-Society Color Council *Newsletter*



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NUMBER 210

January-February 1971

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## 40TH ANNUAL MEETING

The 40th Annual Meeting of the Inter-Society Color Council will be held at the Statler-Hilton Hotel, New York, N.Y., on Monday and Tuesday, April 19 and 20, 1971.

On Monday, April 19, open meetings of the ISCC Problems Subcommittees will be held. As in the past, members and friends of the Council are encouraged to attend this Monday session. Both morning and afternoon meetings will be held.

On Monday afternoon, a special Forum will be convened on a topic of interest to a wide spectrum of Council members:

3:00 to 5:00 P.M.

### Artists and Artisans Colorants: Yesterday and Today

Rita J. Adrosko, Associate Curator, Division of Textiles, Museum of History and Technology, Smithsonian Institution, Washington, D.C., will speak on problems in the study, preservation and restoration of textiles. She is the author of "Natural Dyes in the United States."

Norman Anderson, Ciba-Geigy Company, Chemicals and Dyestuffs Division, Ardsley, New York, will speak on colorants used in the newer yarns and fabrics.

Robert L. Feller, National Gallery of Art Research Project, Carnegie-Mellon University, Pittsburgh, will briefly discuss artists' pigments of the past and modern attempts to improve standards of light fastness of artists' pigments. He is an ISCC delegate representing the American Artist's Professional League.

Herbert Aach of the Dept. of Art, Queens College, will speak on painting with fluorescent pigments, the types available, and technical problems in their use. Mr. Aach has been using these materials for a number of years and recently described their use in the international art journal Leonardo.

The annual business meeting will be held on Tuesday morning, April 20, and will include the presentation of reports by Chairmen of Member-Body Delegations as well as by Officers and Standing Committee Chairmen.

This meeting will be followed at 11:00 A.M. on Tuesday by a talk on color problems in lithography, presented by Dr. Manuel de Torres, President of Metro Lithographing Company, Moonachie, New Jersey.

Mr. Warren L. Rhodes, Xerox Corporation, Webster, New York, program co-chairman for this year's meeting, has arranged a symposium for Tuesday afternoon titled "Optimum Reproduction of Color." This symposium will review and summarize the proceedings of the Council's Special Technical Conference of the same title held in Williamsburg, Virginia, February 1-3, 1971. Speakers will be Mrs. Bonnie K. Swenholt, Photographic Technology Division, Eastman Kodak Co.; Dr. Robert T. Kintz, Physics Research, Eastman Kodak Co.; Mr. Stanley Quinn, Chief of Development and Engineering, Canadian Broadcasting Corporation; and Mr. Rhodes (see below).

The 40th Anniversary Banquet of the Council on Tuesday evening will include reminiscences of the early days of the Council by Dorothy Nickerson. The 1971 Godlove Award will be presented to Norman Macbeth by George B. Gardner, Chairman of the Award Committee. Dr. Robert Feller, program co-chairman for the meeting has announced that the banquet speaker will be Dr. H. Lester Cooke, Curator of Painting at the National Gallery of Art, Washington, D.C.

### April 20th Banquet Speaker:

The speaker at the banquet will be Dr. Hereward Lester Cooke, Curator of Painting at the National Gallery of Art, Washington, D.C. When asked for a title, he asked us how we liked "Color is a Shady Lady." The program chairman liked that fine, particularly after its derivation and significance was explained. (Come and find out on April 20th.)

Dr. Cooke is the author of "Painting Lessons from the Great Masters" in which he explains to would-be artists and appreciators of art the tricks of light and shade which the Great Masters used to create the illusion of form and space on a two-dimensional surface. Dr. Cooke will discuss the emotional,

illusionary and iconographic uses of color in painting. He will emphasize how much "realistic" pictures are actually abstractions of what the eye has seen, and that the creation of harmony in form and color remains very much an art.

Dr. Cooke is a successful artist, educated in England at both Harrow and Oxford, where he took an honors degree in philosophy and history. In the late 1930's, he attended the Art Students League in New York, then enrolled in the School of Fine Arts, Yale University, to continue his painting studies.

As a pilot and combat intelligence specialist for the Army Air Force during World War II, Dr. Cooke was sent to China, Burma, India, and the Southwest Pacific, receiving the Bronze Star and the Air Medal. After the war, he entered Princeton's Graduate Department of Art and Archaeology, where he received an M.F.A. and completed the course work toward his doctorate. He stayed on as Instructor and Artist-in-Residence until 1951, when a Fulbright Fellowship took him to the Sorbonne in Paris to complete his doctoral thesis.

From Paris he went as a Senior Fellow to the American Academy of Rome, and there undertook an important study of Italian drawings which ultimately led to the publication of the scholarly book, Roman Drawings at Windsor, co-authored with Sir Anthony Blunt. After four years of painting and study, Dr. Cooke returned to America and joined the staff of the National Gallery of Art, where he has been Curator of Painting since 1962.

For advance registration forms, write to:

Dr. Fred W. Billmeyer, Jr., Secretary  
Inter-Society Color Council  
Rensselaer Polytechnic Institute  
Troy, New York 12181

## THE 1971 WILLIAMSBURG SYMPOSIUM

The ISCC again succeeded in bringing together individuals of diverse interests and backgrounds to discuss a common interest -- color. This time the topic was color reproduction, or perhaps more appropriately, color images. About one hundred engineers, scientists and individuals practicing the arts of television, cinema, photography and printing met for three days in colonial Williamsburg, Virginia, to review and discuss their diverse views about how to produce color images of optimum quality.

When John Yule of Rochester Institute of Technology proposed the Symposium to me a few years ago, it struck a responsive chord. He and I had discussed the

subject many times before. The topic became one of my favorites in talking with manufacturers of color reproduction scanners (an electronic device used to make printing plates from color photographs). John worked on one of the first color scanners which was used commercially. It was invented at Kodak where John worked at the time. In the early 1950's Time, Inc. developed the scanner for use in their magazine and for commercial use.

At that time printers made excellent reproductions by using skilled craftsmen who worked on printing plates by hand. Time, Inc. wanted the scanner not because they expected superior results, but because they hoped to lower the costs and reduce the time required for artistic modifications of color plates for printing. For the first time, printers could produce any results they wished by manipulating the electronics. I was intrigued by the printer's dilemma. Although he had a versatile and powerful new tool, he did not know what instructions to give it to produce excellent color reproductions. The necessary information was in the heads of the artists, and none knew how to translate it. Some tried to solve the problem by asking the artist to work with the scanner. Some sabotaged the machine. (Times change. This attitude infuriated intellectuals, who, in 1971 might side with the artist.) Others simply could not translate their ways of working. In 1971 the situation has changed. More and more of our commercial color printing passes through a scanner. Much of the work is excellent. But, we still know little about what makes some color pictures excellent and some poor. Workers still make decisions intuitively although their tools are no longer knives and brushes.

When John asked me to co-chair the Williamsburg Symposium, I reflected on the discussions we had had. We both felt that the problems one struggled with in printing must also exist in cinema, photography and television. Ralph Evans at Kodak knew a lot about appearance and had published information which was very helpful to us. Bob Hunt of Kodak Harrow had obviously thought a lot about the subject. His book and articles dealt with printing, photography and television. The TV industry had established a committee on color, partly to set standards and partly to study quality. Stan Quinn, CBC Television, Daan Zwick and LeRoy DeMarsh of Kodak responded to our requests to participate. Other names kept popping up wherever we talked: Jim Bartleson, Bob Burnham, W. D. Wright and W. T. Wintringham. Here was an opportunity -- a chance to learn from more sophisticated technologies. The deal was clinched when Milt Pearson of RIT agreed to handle all the arrangements -- a task too big for me to take on and one which George Gardner handled so competently in other Williamsburg Symposia.

As we received the prospects we realized that the name "Kodak" dominated the subject. The prolific David MacAdam has made his contributions to the subject. (In 1951 he proposed a criterion for judging

the quality of color reproductions which the conference seems to have confirmed. He quoted Renoir, "I just keep painting and painting until I feel like pinching -- then I know it's right.") Both Yule and Bartleson worked a major part of their careers at Kodak. Hunt, Zwick, DeMarsh and Burnham are at Kodak. While we did not try to avoid putting Kodak people on this program, we did try to balance it as well as we could. We especially looked for visual perception psychologists who might shed some light on appearance phenomena. We also looked for photographers who could be articulate concerning their understanding of the requirements for high quality in color photographs. Milt Pearson tried valiantly to persuade an artist who paints realistically, such as wildlife painters, medical illustrators or catalogue illustrators. None of those Milt talked with felt that he could make a contribution. Perhaps they, like the artists in printing, know how to get results but not how to explain what they know.

As we talked with people about the project, we began to realize that our problems are very much alike. Much of the time the results of our efforts are good, sometimes excellent and sometimes poor. Often we don't know why in advance but we are usually unanimous in our judgments of quality. To say it differently, "We know what we like. We don't know what to do to guarantee those excellent results consistently." Quite possibly this is precisely the skill of the art directors, photographers or cameramen. He may not know how to write down the ways to manipulate lighting, choice of camera position, costumes, etc., but he knows when it is "right." He may mentally compensate for changes which will take place in subsequent steps. He may remember that some things "work" and others "don't work."

By this time we knew that we had hit upon a subject which many people wanted to know more about. Most of those we contacted, outside the fields of art and psychology, readily accepted our invitation. (See Program at end of article.)

Evans, in an unprecedented performance, spoke at the Symposium without illustrations. Few people can discuss visual phenomena without illustrations, and one does not expect Evans to even consider the challenge. He did so -- successfully. He described three separate color photography possibilities (prints): (1) The person looking at the photograph never saw the setting, (2) the viewer knows the scene but cannot compare the photograph with it, and (3) the viewer can compare the photograph with the scene (as in Color Polaroid photography). In situation (1) the viewer may know what elements of the scene should look like, for example grass, skin, sky, water, trees, etc. In this case the photograph is satisfactory if no color offends the observer's experience with similar colors. In the second case the viewer might remember that the water was muddy, the grass brown or the sky overcast. In these cases the viewer is satisfied if he

would give colors in the photo the same name as he would in the scene. No color photographs will be called satisfactory when compared directly with the subject. All shadows will look darker in the print and all contrasts will be greater in the print. None of the light sources in the scene will look bright enough in the print, including specular reflections and "catch" lights. Much visual phenomena depend on our ability to see, infer and compensate for the light source and illumination in visual scenes. We learn to observe the characteristics of objects under varying lighting and illuminating situations -- for example, shadows. A white object looks white no matter where it is placed in a room. Light reaching your eye from the white may be far less than the light from a gray one, yet you see the object as white. This "lightness constancy" is stronger in scenes than it is in prints and the photographer must compensate for it if the photo is to look right.

The sharpness of a print is also important. Unsharp photographs have to be more contrasty and more saturated to look right. Within one photograph some areas may be sharper than others. These will look more saturated and contrasty.

Evans has proposed a "consistency principle" concerning changes in color between the scene and the photographic print. In general, if the relationships among the colors of the print roughly correspond to their relationships in the scene, then viewers will find the photographs satisfactory.

Evans also pointed out that the size of the print is an important factor. He said that people adapt to the peculiarities of a color process.

In general, amateur or snapshot photographers are satisfied with "acceptable" results which are not colorimetric or visual matches between the print and the scene. He said that colorimetric matching is not a satisfactory criterion for photographs, but that the photograph is an object itself -- a creative product of the photographer. The ability of the photographer to visualize the factors which affect quality and manipulate them is far more important than the characteristics of the process, such as spectral sensitivities, dye characteristics, etc. This may account for his claims that to raise a photograph from "acceptable" to best quality may cost \$2,000.

Hunt (and Wright) feel that consistent desaturation (all colors proportionately desaturated) produces acceptable photographs. Wright believes that this desaturation is consistent with our experience with overcast days and low illumination levels.

The most effective demonstrations at the Symposium illustrated the visual effects of surrounds. Movies and slides are usually viewed projected on a screen in a darkened room. Television is seen in subdued room light. Prints and printing reproductions are seen in

fully lighted rooms. Darkening the surround lowers the visual contrast and the saturation of the picture.

Hunt and Bartleson showed dramatic illustrations of the "graying" of colors by changing the "white reference" in projection. Hunt said that slides and movies should have a contrast of approximately 1.5 for projection with a dark surround. The shadows may need even higher contrast to compensate for flare light in the projector and in the observer's eyes. Television viewing calls for a contrast (Gamma) of about 1.2. Prints should have a contrast of 1.0.

Both Hunt and Bartleson talked about the increase in saturation and contrast of pictures seen in high illumination levels. The case was clearly made that the photographer, cameramen and TV engineer must be aware not only of the color of light forming the image (TV phosphors, projection lamps), but also the illumination level and surround.

Bartleson also suggested that we change our methods of plotting reproductions. All luminances should be plotted relative to the white of the scene and the white of the print. He feels that both the scene and the reproduction should be represented in "visual" color space and proposed a transformation of CIE space into "visual space." I did not understand what he said. Moreover, I cannot believe that we need another color space. (John Yule also proposed a new color space. I have the same feeling about it.)

I am not sure that I understood correctly, but I think Bartleson suggested that if we plot in this "visual space" we may find that one-to-one correspondence is a satisfactory criterion for color reproduction. He didn't quite go that far because he proposed that the photograph is a new object, to be appraised not so much as a reproduction of something but on its own merits. He reminded us that MacAdam found that preferred reproductions of skin tones do not match average skin either visually or colorimetrically. The preferred color is similar to the "memory color" of skin. Blue sky and foliage, however, are better if the prints showing them are closer to "natural" color than to "memory color."

Yule referred to Bartleson's work in discussing a project to study the reproduction characteristics of photomechanical prints. By placing a transparency on a viewer with the surround illuminated to room ambient levels, he was able to compare the print favorably with the transparency. When one views a transparency in a dimly lighted surround, no print can produce the same high quality effect. By using such a viewer, John and his co-workers were able to make direct comparisons between transparencies and color prints made by printers.

He concluded that saturation scales as well as lightness scales provided a useful tool in analyzing a reproduction process. He found that many excellent

prints violated Evans' "consistency" principle. The project has just started at Rochester Institute of Technology. He hopes to evolve some principles which can be used by printers and scanner manufacturers.

An interesting difference in philosophy surfaced in North American and European television. It concerns TV signals obtained from color movies. Here the signals are adjusted so that the TV image matches the projected color movie images. In Europe the TV signals are adjusted to correspond to the colors which were in the original scene.

All the speakers on color TV said that the current criterion is a colorimetric match. They all realize that this is not a suitable criterion, observing that Hunt found a contrast of 1.2 and increased saturation were required for a visual match, due to the dim surround. As long as no other criterion is commonly used, they probably will not change.

The TV engineers found that the "white" of the TV picture is commonly a very high color temperature and should look bluish in the warm color temperature common for home viewing in the evening. Probably the fact that the TV picture is very bright compared with ambient lighting makes us tolerant of the large difference. Older sets had to be bluish because the red phosphor was not capable of producing enough light. With new red phosphors, this is no longer necessary, but we will probably have to press our repairmen to set the balance to the better warmer color.

Having listened to the many problems of TV broadcasting -- camera variations, misadjustments of home receivers by servicemen (and manufacturers) mixing outdoor, studio, movies and video tapes -- I can understand Daan Zwick's observation that, "Just as the consumer learned to accept poor sound reproduction, so shall he learn to accept poor color reproduction."

I know I have not done justice to the subject or to the speakers, but I must stop here. Even with ample time allowed for discussion, three days were not enough time. A book will not contain the subject, although Milt Pearson of RIT will attempt to preserve some of the wisdom by publishing as complete a proceedings as he can put together.

I have asked W. D. Wright to write his summary for the Newsletter. I hope he can do so because my notes are inadequate and because his comments warrant a second article on the conference.

Dusty Rhodes



**PROGRAM**  
**ISCC CONFERENCE ON OPTIMUM**  
**REPRODUCTION OF COLOR**

Williamsburg, Va. -- January 31 to February 3

**Sunday, January 31**

Reception 5:00-7:00 P.M.

**Monday, February 1**

1st Session 9:00 A.M.-12:00 Noon

W. L. Rhodes, Session Chairman

R. W. G. Hunt -- Objectives in Color Reproduction

R. M. Evans -- Accuracy in Color Photography and Color Television

2nd Session 7:00 P.M.-10:00 P.M.

Howard Colton, Session Chairman

C. J. Bartleson -- Color Perception and Photographic Reproduction

R. W. Burnham -- Informal Discussion of Research Activities at Eastman Kodak

**Tuesday, February 2**

3rd Session 9:00 A.M.-12:00 Noon

W. T. Wintringham, Session Chairman

LeRoy DeMarsh -- Television Colorimetry

R. Brodeur, K. R. Field, and D. H. McRae -- Color Rendition in Color Television

Daan Zwick -- Reproduction of Color Film in Color Television

Luncheon 12:30 P.M.

Presentation by National Geographic Society

4th Session 7:00 P.M.-10:00 P.M.

Dr. Gunter Wyszecki, Session Chairman

W. L. Rhodes and M. L. Pearson -- Review of Color in Graphic Arts

Karl Thaxton -- An Electronic Color Previewer for Controlling Color Process Printing

N. I. Korman -- Consideration on the Optimum Reproduction of Non-Printable Colors

**Wednesday, February 3**

5th Session 9:00 A.M.-12:00 Noon

R. W. Burnham and John Yule, Session Chairmen

Irving Pobboravsky -- The Relationship Between Photomechanical Reproductions and the Original Copy

M. Austin -- The Relationship Between Colors in an Original, the Reproduction Process and the Color

Gamut of Process Ink Sets for Newsprint

B. H. Sunderland -- An Approach to Tone and Color Reproduction in Graphic Arts Color Printing

W. D. Wright -- Informal Summary and Impressions of the Conference

Conference Adjourned 12:00 Noon

**NOMINATIONS INVITED FOR**  
**MACBETH AWARD**

The Macbeth Award, established in memory of Norman Macbeth, Sr., 1873-1936, will be presented for the first time at the 1972 annual meeting. This award is given to recognize recent important contributions in the field of color, preferably within the 5 to 10 years preceding the Award. These contributions may concern a specific project, application, service or use of color, or other accomplishment related to color in science, art, industry, education, merchandising, etc.

Through the Newsletter the Macbeth Award Committee invites nominations of candidates from individual members of the Inter-Society Color Council. A similar invitation is being sent to the chairmen of ISCC delegations in order to provide the opportunity for nominations from each Member Body.

The candidate need not be a member of the ISCC, nor be a citizen of the United States. Nominations should be made prior to June 1st by letter from the nominator to the chairman of the First Macbeth Award Committee, Dorothy Nickerson (2039 New Hampshire Ave., N.W., Washington, D.C. 20009) and should contain the name, address, and affiliation of the nominee, and discussion and supporting data, with exhibits if appropriate, of the nominee's particular achievements or activities on which the nomination is based. The Award qualifications and nomination letter will provide a basis for the selection.

Members of the Award Committee are: Robert Seller, Delegate from AAPL; Leo M. Hurvich, APA; W. T. Wintringham, SMPTE; John A. C. Yule, TAGA; Dorothy Nickerson, OSA.

D.N.

**INSERT: BROCHURE ON COLOR**

An advertising brochure on COLOR -- Past, Present, and Future -- done by Faber Birren for Westvaco Corporation has recently come to our desk. It is of more than usual interest, both in its printed illustrations and in the text, a brochure that may be of interest to most ISCC readers. The Westvaco Corporation has kindly contributed enough copies for inserts to this edition of the Newsletter.

## NEW PUBLICATION

The MIT Press announces publication of "Sources of Color Science," selected and edited by Dr. David L. MacAdam of the Research Laboratories, Eastman Kodak Company.

## LETTER TO THE EDITOR

I think I ought to say something via the ISCC News-letter. I notice in the Sept.-Oct. 1970 issue, No. 208, p. 19, that H. Helson and T. Lansford have a book, APPLIED OPTICS, Vol. 9, page 1513, July 1970, with a quote of the author's abstract, in which an experiment was done with 5 men and 5 women rating colors. Then, apparently, what was found was treated statistically and "found to be highly significant statistically."

I take issue with this sort of thing whether done by these authors or previous experimenters, such as Guilford, or any others guilty of the same thing; namely, arriving at conclusions on the basis of too few people, or too few samples from the total population.

In my own article in the November-December 1969 issue of COLOR ENGINEERING, "Favorite Colors," p. 46, (which had the misfortune to have columns two and three reversed in order, first page) I described my own experience with a color survey involving 50 men and 50 women. I do not see how anyone doing research or experiments with color can be satisfied with 5 men and 5 women as Helson and Lansford have done, or 20 men and 20 women as Guilford did. I am not even satisfied with 50 of each sex. I fully expect that results would be different with 500 of each. I know that my results were very different from Guilford's, at least, and I know why we had different results.

One cannot sample as few colors as he did and expect significant results when these are distributed over so few people. It is amazing to me that colorists will accept this sort of thing as evidence, despite his great authority.

And I am surprised that anyone would take even fewer people as Helson and Lansford did, although the work done with them was prodigious and admirable. Nevertheless, such findings cannot be expected to mean much with so few people. The distortions of such statistics (sic) can cause great deviations in the evidence obtained unless, by coincidence, it happens to be correct and significant. There is no guarantee that this could happen except by luck.

Don F. Hill  
3637 Canyon Crest, Apt. H-303  
Riverside, California 92507

## REPLY TO LETTER TO THE EDITOR

In the field of experimental aesthetics I know there is more feeling and emotion than there is light or data. The situation is similar to what an English professor once told me: Everyone thinks he knows English because he speaks English. So everyone thinks he knows aesthetic answers because he likes or dislikes certain paintings, compositions, statues, colors, and what have you. The acquisition of knowledge in this area is not any faster or any easier than in other areas; and it can be won only by slow, small steps based on experimental data.

Let me reply to Mr. Hill and, probably, many other critics who will probably feel much as he does about an experimental approach which cannot help from being limited in one way or another. Of course he has a point and no one is better aware of the limitations of sampling than the experimental psychologist. But let us not forget that the Gallup poll predicts elections based on the votes of 65 or more million people by sampling the opinions of only 1200! By proper choice of 'subjects' the sentiment of the country is closely approximated in many, many cases.

Now our experiment was not as poverty-stricken as Mr. Hill implies. Our choice of 125 colors from the 900 or so in the Munsell is a pretty fair sampling of the whole set of colors. And the more than casual reader of our results will find different lines of evidence converging toward our conclusions. Certain color combinations (and the reader of our work must always keep in mind that our subjects were always judging a color on a background of color) stand out as good, others as poor. Results, taken independently, in one source of light confirm those taken in another source of light. One cannot ignore consistency in independent observations. I will wager, giving heavy odds, that 100,000 people judging the colors we used on our backgrounds will overwhelmingly say the color-background combinations on the left of our Table XIV (labelled good) are better than the ones on the right (labelled bad). The differences in the ratings are so great, as a rule, that even with a small number of subjects we can be very sure that they will hold up with many, many more subjects.

Again, the differences between the preferences of the men and women, both as to object colors, backgrounds, and quality (spectral energy) of sources is so clear-cut that, again, I will wager, giving great odds, that women prefer the warm colors, whether in sources or in object colors, and men prefer the cool colors. The larger the number of subjects, the more sure I am that our results on this point, as well as on many others, will be replicated because of the clear separation by sexes. There are still other converging lines of evidence but I cannot go into them here.

Now there are some findings that are not so clear-cut

and further studies, with larger numbers of subjects may yield different results. I think we have indicated which results are 'strong' and which are more open to question.

Finally, some readers of our study, like Mr. Hill, may misunderstand the purpose and role of scientific exploration. This is a scientific study; what the reader does with the results depends upon the situation he wants them for. We do not present our results as applicable to all conditions, all times, all uses. We formulated certain principles based on our results and suggested further work should be done. Ours are about the only data taking into consideration color of source and chromatic background effects on pleasantness of object colors. Previous studies have employed only a single source, most of them natural light, and neutral (achromatic) backgrounds. At least we have broadened the approach to the question of pleasantness of object colors by including source and background color. This is practically the first study of its kind; we hope and expect others will follow it.

One difficulty with readers of our work I see no way of overcoming: differences in training, background, interest. We approached this study as psychologists with a background of experimental psychology, statistics (including sampling theory), psychophysical methods, and (I can say with modesty) quite a large experience in evaluating human behavior under experimental conditions. I am sure people with other backgrounds also have something to contribute but when they criticize us I expect them to meet us on our own ground.

## REPORT ON MEMBER-BODY LIAISON

On November 6 I mailed a letter and questionnaire to chairmen of each of the 32 member-bodies of the ISCC. To date 26 have replied.

I thought interesting the answers to a question about ways in which ISCC can serve its member-bodies.

- AAPL -- Relating special technical subjects to fine arts -- new products -- new techniques with potentials in the visual arts.
- ACHS -- The American Chemical Society has just begun to participate in ISCC activities. We will be able to better define our needs in the future.
- AIA -- It is most helpful at the present time.
- AOCS -- Don't know of any.

- ASP -- Speed up activity on the organization of Problem 31.
- ASTM -- Due to many common memberships in ASTM & in ISCC, communication and understanding could not be greatly improved.
- CAUS -- Reports from other member-bodies giving more specific color information for their area.
- FSPT -- By providing slides, films and demonstration material.
- GATF -- Due to broad interest in committee activities, keep us informed of activities and progress possibly through the Newsletter.
- IDSA -- We need to serve ISCC.
- IFT -- Include in ISCC symposia qualified people preferably from the voting delegates to speak.
- NSID -- ISCC is doing fine -- our own delegation needs to coordinate information more.
- OSA -- I do not have any specific suggestions beyond always making sure that there are annual reports to and from the OSA and ISCC -- and keeping channels of communications open.
- PDC -- By restructuring itself gradually to reflect designer participation. Designers don't want to be "served." There's insufficient two-way understanding at present.
- SPE -- By arranging for better dissemination of information about color activities in member groups.
- TAGA -- The mechanism for interaction exists. Urge us to use it.
- AATCC -- None.

R. S. Hunter  
Chairman

## SURVEY OF COLLEGES FOR COURSES ON COLOR OR APPEARANCE

As part of the ISCC Color Information Bureau effort to assemble information, I undertook a survey of college courses dealing with color and appearance.

A letter and questionnaire were sent to a sample of 200 colleges and technical schools from a list of about 800 in the Blue Book for the United States and Canada. To date, about 20 replies have been returned. Almost all deal with courses in Art Design and Architecture. I have no returns as yet from engineering and scientific schools.

From the information I have been getting and from the slowness with which responses are coming in, I now suspect that the way to get the information we want is to ask specifically for yes or no answers whether the colleges contacted have courses on specific subjects which we will name. Before I prepare such a list, I certainly want to get the help of my ISCC associates who are more familiar with the educational course classifications in the Art and Design area than I am.

I should like very much to have some one in the Art and Design educational area join me in this enterprise.

R. S. Hunter

## JOURNAL OF COLOR AND APPEARANCE

A new journal, as above, will be published beginning in June, 1971. It will be a bi-monthly publication with a paid circulation of \$12 per year, or \$9 for charter subscribers. S. Gray Maycumber, formerly Editor of Color Engineering, will be Editor. A partial listing of the Editorial Board is as follows:

Richard S. Hunter, Hunter Associates  
Ralph M. Evans, Eastman Kodak Co. (retired)  
Frederick T. Simon, Clemson University  
Robert Feller, Mellon Institute  
Eugene Allen, Lehigh University  
C. J. Bartleson, Kollmorgen Corp.  
Fred W. Billmeyer, Jr., Rensselaer Polytechnic Inst.  
Hugh Davidson, Kollmorgen Corp.  
Harry K. Hammond, National Bureau of Standards  
Sam J. Huey, Sherwin-Williams Corp.  
Max Saltzman, Allied Chemical Corp.

The journal will be published by Gordon and Breach, New York.

The principal goals of this journal are:

To present serious, carefully reviewed papers on all aspects of color science and technology, including theory and research on color vision, dye and pigment technology, color reproduction by both photographic and printing processes, color psychology (with emphasis on appearance problems), color measurement and control (and the mathematics involved), color technology of art materials, and other scientific and technical aspects of color. Emphasis will be on both the primary usefulness of the paper and its

potential to stimulate further work in its area. Historical, review and application articles will be accepted when they present original material.

To provide a forum for comment, opinion and criticism concerning color science and technology. This special department encourages the publication of works shorter than "paper length" that would stimulate a dialogue to further communication in the field and deal with current and future color problems.

To cover concisely the important news and events that directly relate to color science and technology throughout the world, including seminars, conferences, important advances in instrument, and colorant technology, research projects, etc., and review the significant literature (both books and papers) in the field.

The international scope will be emphasized and the Editorial Board will include scientists from several countries. International color activities will be reported and translations of selected papers not previously published in English will be presented from time to time.

For information write:

Gordon and Breach, Science Publishers, Inc.  
440 Park Avenue South, New York, N.Y. 10016.

## COLOR MARKETING GROUP

The next Color Marketing Group semi-annual meeting is scheduled for May 2-5 at the Drake Oakbrook Hotel in Chicago. The role of color in solving pollution problems will be discussed in depth. Featured speakers and panel discussions will concentrate on color in our environment for this assembly of the nation's leading color stylists, designers, and producers.

Another feature of this meeting will be the annual COLORMART where members of the Color Marketing Group show what they do in the color field. The newest concepts in the use and application of color are displayed.

The meeting is open to all those who are interested in, concerned with, or are subject to the problems regarding the use or application of color. For further information write: COLOR MARKETING GROUP, 1000 Vermont Ave., N.W., Washington, D.C. 20005.

## COLOR VISION MEETING

This year the subject of the Spring meeting of the NAS-NRC Committee on Vision will be Color Vision. Brief reviews of physiological and psychophysical



work will be presented, but the bulk of the program will be devoted to applications of interest to the sponsors of the Committee; these include the Armed Forces, NASA and the FAA. The meeting will be held at the National Academy of Sciences, 21st and Constitution Avenue, Washington, D.C. on May 20 and 21, 1971. For additional information, contact:

Dr. William Benson  
Executive Secretary  
Committee on Vision  
2101 Constitution Avenue  
Washington, D.C. 20418.

There is no registration fee and nonmembers of the Committee will be welcome.

### SOCIETY OF PHOTOGRAPHIC SCIENTISTS AND ENGINEERS

The 1971 Annual Conference of the Society of Photographic Scientists and Engineers is scheduled for April 21-23, 1971 in Chicago, Illinois. The conference, Image 71, will be held in conjunction with Photo-Expo (April 17-25), the major exhibition of photographic equipment and technology sponsored by the National Association of Photographic Manufacturers.

The Annual Conference will cover a broad range of scientific and engineering subjects with a number of invited papers by recognized authorities. Representative topics will include Photography in Ecology, Photographic Processing Theory and Equipment, Emulsion Chemistry, Spectral Sensitizing, Solid State Phenomena, Information Storage and Retrieval, Electro Photography, Photo Instrumentation Techniques and Equipment, Image Structure and Photography in Graphic Arts.

For information write to:

John L. Acuff  
1330 Mass. Ave., N.W., Suite 204  
Washington, D.C. 20005

### DRY COLOR MANUFACTURERS' ASSOCIATION GRANTS

DCMA grants and memorial gifts have been awarded during the present academic year to Rensselaer Polytechnic Institute -- Color Measurement Laboratory, University of Cincinnati -- Department of Physics, and Clemson University -- School of Industrial Management & Textile Science, for their continuing studies and work in the field of light and color. The University of Cincinnati gift was a memorial to Mr. Edward J. Sheridan, long active in the progress of the pigment color industry.



Reproduced with permission of American Cyanamid Company, Dyes and Textiles Chemicals Dept.

We gratefully acknowledge also word from the National Printing Ink Research Institute, Lehigh University, that they are "at home" in the new Frances MacDonal Sinclair Laboratory and expressing appreciation for the DCMA Blackstead memorial gift supporting the research work and building fund.

The Society of Plastics Engineers award for the best paper on pigment colors for plastics will be continued. It will be recalled that last year's award was won by Messrs. Dills and Reeve, duPont, for their excellent paper on the subject of "Principles of Pigment Dispersion in Plastics."

Max Saltzman  
Chairman, DCMA Delegation

## CHARLES BITTINGER DIES AT 91

Charles Bittinger, artist, member of the ISCC since its formation in 1931, died on December 18, 1970 in Washington, not many months after the death of Edith, his wife of 66 years. The Bittingers had lived at their O Street address in Georgetown since 1929 when they returned with their three children after many years spent in Paris and New York. In Paris -- where he had gone to study at the Ecole des Beaux Arts after two years at the Massachusetts Institute of Technology -- he met and, in 1904, married Edith Gay, a young concert singer also studying abroad. While Mr. Bittinger opened a studio in Georgetown, and took an active interest in both the Arts Club and the Cosmos Club, his wife became equally interested and well known in area gardening clubs.

During both world wars Mr. Bittinger -- Captain Bittinger to many of us in later years -- served in the Navy. It may be that his keen interest in color, particularly in its scientific aspects, was awakened by his exposure in the first world war to the needs of naval camouflage. During the early 30's he painted a series of murals for Philadelphia's Franklin Institute, murals which became visible only when illuminated by ultra violet light. In 1937 he was part of a joint U.S. Navy-National Geographic expedition to the Phoenix Islands in the Pacific in which he set out to paint a solar eclipse in colors that would be as accurate as he could possibly make them, with scientists around him taking color photographs and many photometric and radiometric measurements. He painted the solar spectrum a number of times, one very large one as the basis for the reproduction that appears in the Merriam Webster Dictionary, Second Edition, to illustrate Dr. I. H. Godlove's article on color and color names. But his reputation as an artist rested chiefly on his paintings of interiors, many of historical interest, although it is said that he won a growing reputation as a portrait painter, specializing in naval figures. In 1946 he received the Legion of Merit for his work in the camouflage section of the Bureau of Ships.

Not only did he help in forming the ISCC in 1931, but he was also quite responsible for the formation in that same year of the Washington and Baltimore Colorists. It was the aftermath of a luncheon with him, and at his instigation, that several of us issued an invitation to "Fellow Colorists" in the area to meet occasionally to discuss the subject of color. Dinner meetings of the Colorists were held for many years with great success, first at the Cosmos Club (at its old Dolley Madison house location) then at the Arts Club. Arrangements at both locations were made by courtesy of Mr. Bittinger.

He was a delightful man to know, a gracious host, with an unending supply of anecdotes and stories to fit every occasion.

As for the Inter-Society Color Council, he attended the preliminary conference on February 26, 1931 that led to the ISCC organization, its first meeting on September 21, 1931, and its "First Annual Meeting" on December 29, 1931, all as a representative of the National Academy of Design. He was elected a member of the first ISCC Executive Committee and was re-elected to serve consecutive terms through 1935. Although the Academy did not join the ISCC as a founding member it was still listed as an "interested society" in 1932, with Mr. Bittinger its representative. When the Academy did not join as a full member, Mr. Bittinger was nevertheless interested enough to become an individual member which he has remained until now, with the added recent notation of "Honorary Member." We shall miss him in our Council.

Dorothy Nickerson

## FELLOWSHIP HONOR FOR ICI MAN

Mr. Keith McLaren, of Imperial Chemical Industries, Dyestuffs Division, has been elected an Honorary Fellow of the Society of Dyers and Colourists. This is only the second time the Society has elected a Fellow, an honour which dates from its incorporation by Royal Charter in 1963.

The first award was made last year to Professor Dr. Ing. Helmut Zahn, head of the German Wool Research Institute at Aachen, who was elected for his outstanding contribution to protein science.

Mr. McLaren's award is for his notable contributions in the fields of color measurement and color fastness.

Keith McLaren, Manager of the Identification and Colour Measurement Section of the Division's Technical Service Department, at Hexagon House, Manchester, is a graduate of the Colour Chemistry Department of the University of Leeds.

For the past 20 years he has been actively engaged in the development of internationally-accepted fastness testing methods, first as secretary, then as chairman of the Fastness Tests Co-ordinating Committee of the society. For his work on the fading of dyes, he was, in 1956, awarded the Research Medal of the Worshipful Company of Dyers.

In 1966 he became chairman of the society's Colour Measurement Committee and at Hexagon House his section is particularly engaged in promoting the uses of color measurement by industry as part of the Division's technical service to its customers. This includes a computer color-matching service first introduced in 1963 and more recently the development of the ICI Colour Atlas which illustrates 27,580 shades.

## SEA BIRD LIGHTING

Bronx Zoo curators tried for four years to make the tufted puffin feel at home. Although the shy sea bird's Northern Pacific habitat had been faithfully duplicated, the birds refused to breed. The answer: a new lighting system that simulates the day length by means of a time clock and a dimming device. The system controls a bank of fluorescent lamps that produce a spectrum similar to natural outdoor light, including ultraviolet. The puffins have since attained a more natural coloration, and for the first time in captivity, one pair has even produced a fertile egg.

From Illuminating Engineering

## INDUSTRIAL DESIGNER'S APPOINTMENT

Arlene S. Kahn has been appointed Manager, Membership Services of the Industrial Designers Society of America.

Mrs. Kahn has been associated with the Society for eight years. Her responsibilities include membership application management, member relations, and other services relating to these areas.

## STEWART SEASE RETIRES

The retirement of Stewart Sease of Rohm and Haas Company's Bristol, Pa., plant has been announced.

Mr. Sease, a native of Sullivan, Illinois, attended Williams College where he obtained his B.A. degree, and Amherst College where he received an M.A. in physics. He joined Rohm and Haas in February, 1955, and was assigned to the Plastics Color Laboratory at Bristol. In 1965 he was appointed head of that laboratory, a position he held at the time of his retirement. He is currently a member of the U.S. National Committee of the Commission Internationale de l'Eclairage; the Optical Society of America; and the Inter-Society Color Council. He is a former member of the American Society for Testing Materials, the Color Specifications Subcommittee of the Society of Automotive Engineers Lighting Committee, the Philadelphia-Wilmington Color Group, Lower Bucks County Chamber of Commerce's Education Committee, and the Langhorne Lions Club. Mr. Sease and his wife Laurie have one child and reside on Station Avenue in Langhorne, Pa.

## BOOK REVIEWS

### Visual Perception

Tom N. Cornsweet, Academic Press, New York and London, c1970. Pp. xiii + 475. Price \$15.00; 140/.

Vision of brightness and color, and its physiological basis so far as it is known, supplemented by a not excessive amount of theory and conjecture, are surveyed in an unusual but plausible sequence. The story starts with the Hecht, Schlaer (consistently misspelled throughout), and Pirenne study of human detection of threshold flashes and ends with speculations on higher processes that take off from Hubel and Wiesel's discovery of cells in the visual cortex of cats that fire only when a line having a particular tilt is anywhere within a fairly large region of a cat's field of view.

In the passage between Hecht and Hubel, the narrative, which resembles stream of consciousness or free association, touches on the physics of light, quantal fluctuations, action of light on rod pigments, excitation of rods, cones and cone pigments, discriminations among wavelength mixtures, retinal color systems, perception of color, psychophysiology of brightness, spatial interactions in the visual system, modulation transfer function, brightness and color constancy, temporal properties of the visual system, and stimulus generalization.

The most notable omission, for a book on visual perception, is any mention of depth perception. Perhaps this was excluded because the author "restricted the coverage to only two kinds of topics, those for which there is a widely accepted explanation, and those for which I can imagine one or more plausible explanations that may not yet have been adequately tested." Among the topics the author mentions as being excluded are the influence of motivation on perception and the perception of movement.

The book is clearly stated to be not a reference book. It is aimed at developing an understanding of visual perception. If read from beginning to end, without skipping, as the author recommends, it will serve that purpose very well. However, it will leave those who learn the subject from this book ill prepared for the technologies of photometry or colorimetry. As the farmer said to the motorist who asked directions to a neighboring town, "I wouldn't start from here." But, introduction to these subjects not being the purpose of this book, this is no demerit.

The book is well illustrated with drawings and photographs, including eight color plates. It has wide margins, clear typography and is remarkably free of misprints. An appendix gives instructions for building an ophthalmoscope with readily obtainable items. Eight pages list special and general supplementary

readings, and the author and subject indices occupy three and six pages, respectively.

Cornsweet's Visual Perception is highly recommended for anyone who wants a thorough introduction to modern research and thought concerning the perception of light and color.

David L. MacAdam  
Reproduced with permission from J. Opt. Soc. Amer.  
1971, 60, 276-277.

### The Ergonomics of Lighting

R. G. Hopkins and J. B. Collins, MacDonald  
Technical & Scientific, London, 1970, 272 pages.

This is the first book to discuss illuminating engineering and the problems of lighting from the viewpoint of human factors. The authors devote a considerable amount of space to the physiological and psychological aspects of vision since their approach emphasizes the effect of light upon the human being. Some of the more important factors that affect visual performance are: 1) the contrast between the object being viewed and its immediate background, 2) the size of the object being viewed, 3) the contrast between the visual task area and the larger area surrounding it, 4) the amount of disability and discomfort glare present, 5) the quantity of illumination being provided. A change in any of these factors will lead to a change in the level of visual performance. The usual approach is to attempt to improve visual performance by increasing the quantity of light.

The authors emphasize that the quantity of light provided is not, by itself, a meaningful figure. What really matters is the brightness of the visual task. This depends on the reflectance of the object being viewed. The quantity of light present can be measured in footcandles. The corresponding unit for measuring brightness is footlamberts. Attempts to improve visual performance by increasing the quantity of light are not always successful because of interactions with some of the other factors that affect performance. An increase in light level can increase glare and this may actually reduce the level of visual performance. Disability (or veiling) glare is particularly insidious. The amount of disability glare present depends on the angle between the visual task and the light source and on the surface characteristics of the visual task. The result is to reduce the apparent contrast of the visual task. Discomfort glare is more obvious. This is caused by high brightness objects, such as windows or lamps, being within the field of view. Discomfort glare can also reduce the level of visual performance. Both types of glare can be controlled through proper design as long as the light levels used are not excessive. For very difficult visual tasks the authors suggest that performance will be optimized by a light

level that produces a task brightness that is somewhere between 80 and 200 footlamberts. Task brightness is excess if 200 footlamberts is likely to produce a deterioration in visual performance. For normal visual tasks much lower light levels are considered to be adequate. A person reading 8 point black type on white paper does not need much more than 10 footcandles. The British Illuminating Society recommends about 40 footcandles for offices, and Hopkins and Collins state that this is more than adequate.

An approach to lighting that places primary emphasis on the characteristics of the human eye is a welcome change. All lighting installations are intended to serve people, but engineering considerations sometimes dominate the thinking of the lighting designer. This new book provides an excellent base of information that the designer can use to assure that his installation fully reflects the needs of the human eye. Unfortunately, The Ergonomics of Lighting will probably be poorly received in this country. The authors suggest that the American Illuminating Society recommendations require excessive levels of light. They point out that the current practice in Great Britain, Germany, the USSR, Australia, etc. is in close agreement. Levels being recommended in the USA exceed those of the rest of the world by a factor of as much as three. These unflattering comments on American lighting practice will probably be strongly resented by most U.S. practitioners.

Terry Faulkner

### Color Television -- Selections from the Journal of the Society of Motion Picture and Television Engineers

Richard S. O'Brien, Editor, New York: SMPTE, 1970, 231 pp. \$7.50.

Twenty years ago (1950) the Society of Motion Picture Engineers (SMPE) adapted to a changing world by incorporating Television into its name (SMPTE). A few scores of articles on television topics had already been published in the JSMPE by that time -- soon after, the number increased markedly. Now, with hundreds of articles related to television having been published in the JSMPTE, it is appropriate that the Society publish a selection pertinent to the current activity in color television.

As stated in the foreword, "The intent has been to make available in one convenient volume a collection of journal papers covering fundamental aspects of color television technology:-----Emphasis has been given to papers covering important principles and concepts which change relatively slowly, if at all, as compared to the rapid evolution of technical equipment."

The volume opens well with J. M. Barstow's "The ABC's of Color Television" which, because it was first (1955) presented to an Institute of Radio Engineers audience, assumes a knowledge of monochrome television. Very elementary colorimetry and fundamental color television principles are clearly covered. (The quality of color printing detracts from the few color illustrations, however.)

This is complemented by C. J. Bartleson's paper (1967) on color perception which, as Bartleson says, emphasizes the vision in television. This fundamental article is thoroughly referenced with over 100 readily available secondary references. Thus, in the first two papers the neophyte can learn how color television operates and how human vision works.

An interesting and still timely comparison of television pictures with motion pictures by D. G. Fink (1955) raises several questions which are still unanswered. The pioneering work of Otto Schade in television image structure forms an important part of the book. This work sparked much of the current work on modulation transfer functions of photographic materials.

Another cornerstone article is that by A. V. Loughren describing the work and the recommendations of the National Television System Committee (NTSC) which were adopted as the color television system for the United States.

Other sections of this collection cover color film, television cameras and studio practices, broadcasting facilities, and measurement techniques. Included also are the standards and recommended practices sponsored by SMPTE which are considered pertinent to television, and an index to all other current standards and recommended practices. A complete index of all papers related to color television (and a great many on monochrome television) published in the society journals since 1940 rounds out the over 200-page volume. The preparation of this index could have received more care. There are many duplicate listings under the same heading, and articles are listed which are completely irrelevant to the subject headings.

A collection of papers is always uneven in quality. However, I found enough excellent and important papers in this selection so that I feel the SMPTE committee which prepared this volume have achieved the goal as given in the foreword. I recommend it as a convenient reference for those whose interests include television, photography, colorimetry and vision. A careful reading gives a sense of history, and an awareness of currently unanswered questions.

D. M. Zwick

## NO SECRETS

A group of some 12 students will be selected soon to share in a \$15,000 renewal grant from the Central Intelligence Agency. The grant will support thesis research in photographic science and instrumentation at Rochester Institute of Technology. The one-year program, administered by RIT, will be in unclassified areas only.

## NEW INDIVIDUAL MEMBERS

- |  |  |
|--|--|
| Dr. Richard L. Abrams<br>AChS<br>Desoto Inc.<br>Administration & Research<br>Center<br>1700 S. Mt. Prospect Rd.<br>Des Plaines, Ill. 60018 | Ph.D. in color science,<br>RPI. Paint, pigments,<br>instrumentation,<br>formulation, AChS.,<br>FSPT.   |
| Mrs. Arline R. Barrett<br>Eastman Kodak Company<br>Kodak Park, Bldg. 69<br>Rochester, N.Y. 14650   | Librarian.   |
| Mr. Robert C. Bailey<br>GATF<br>Vice President,<br>Manufacturing<br>Western Lithograph Co.<br>6200 Avalon Blvd.<br>Los Angeles, Cal. 90003 | Source, object and<br>receiver, as related to<br>the appraisal of<br>color reproduction.   |
| Mr. Robert E. Bash<br>1350 Steele Ave., S.W.<br>Grand Rapids, Mich. 49502  | Paint formulation and<br>color control with<br>instruments.  |
| Mr. Benjamin H. Bell<br>AATCC<br>Klopman Mills<br>P.O. Box 391<br>Altavista, Va. 24517   | Formulation, control of<br>incoming dyes, production<br>control of color of tex-<br>tiles, analytical solution<br>of color problems.   |
| Mr. Charles F. Bino<br>Burlington Industries<br>R & D<br>Greensboro, N.C. 27409  | Quality control tech-<br>niques for measurement<br>of textiles. Use of color<br>as an identification<br>medium for unknown fiber<br>blends.  |
| Mr. John E. Dean<br>AChS<br>2407 Murphree Rd., S.E.<br>Decatur, Ala. 35601   | The development of color<br>measurement techniques<br>for monitoring the quality<br>of raw materials; pig-<br>ments and basic dye-<br>stuffs; the production of colored textile fibers; and the<br>grading of final product fiber. |



Mr. Henry L. Dollard  
AChS, SPSE  
5300 Crestedge La.  
Rockville, Md. 20853

Application of color in solving problems of identification; color processing (photographic) and reproduction of color films.

Mr. Hugh S. Fairman  
AChS, NPVLA  
1313 Lunt Ave.  
Elk Grove Village, Ill. 60007

Metamerism, uniform color space, color difference formulae.

Mr. W. J. Kiernan  
AATCC, AChS, ASTM,  
OSA, TAPPI  
38 Beechwood Rd.  
Florham Park, N.J. 07932

I have an interest in all aspects of color in art, science, and industry. (Also past-president and long time delegate of the Council, recently

retired -- Secretary's note).

Mr. Robert Loekle  
GATF, SPSE, TAGA,  
TAPPI  
109 Waverly Pl.  
New York, N.Y. 10011

Printing inks, process color reproduction, color photography, quality control, color measure and specification.

Miss Else Metzger  
350 Fifth Ave, Rm. 5508  
New York, N.Y. 10001

Psychological, philosophical (Goethe's Farbenlehre), industrial for leather, man-mades and textiles.

Mrs. Judy E. Myers  
Univ. of Houston Libraries  
Attn: Serials Dept.  
Cullen Blvd.  
Houston, Texas 77004

Librarian.

Mr. Richard G. Neidich  
SPSE  
2802 Rose Valley Dr.  
Oxon Hill, Md. 20022

Color image evaluation and the reproduction of color images.

Mr. Raymond E. Phipps  
c/o Macbeth Corp.  
Box 950  
Newburgh, N.Y. 12550

(Capable assistant to our Treasurer -- Secretary's note)

Mr. Robert D. Rosenthal  
CMG, OSA  
1132 Taft St.  
Rockville, Md. 20850

Color usages. (President, Neotec Corp. -- Secretary's note)

Mr. Frederick Truchess  
Stony Ford Rd, RD 2  
Middletown, N.Y. 10940

As I use color from concept to the final -- would like to have a far better understanding, education, and (awareness of) any new developments regarding the word "color" and its use today in industry.

Mr. William R. Wright  
Architect  
Caterpillar Tractor Co.  
100 N.E. Adams  
Peoria, Ill. 61602

Psychological and visual results of color design in various industrial and commercial applications.

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Dr. Fred W. Billmeyer, Jr.  
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Rensselaer Polytechnic Institute  
Troy, N.Y. 12181