

Inter-Society Color Council *News*

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THE 57TH ANNUAL BUSINESS MEETING OF THE ISCC

The 1988 annual business meeting of the Inter-Society Color Council (ISCC) was held on May 9, 1988 following the Business and Awards Luncheon.

After calling the meeting to order, President Allan B. J. Rodrigues recognized General Chairman W. Nick Hale, Program Chairman Lawrence R. Tannas, Jr., and all ISCC members involved in the planning of this meeting, thanking them for their time and effort in organizing such a successful event. This 57th Annual Meeting included a symposium co-sponsored by the Society for Information Display (SID), one of ISCC's Member-Bodies. President Rodrigues thanked SID for their participation, and invited other Member-Bodies to consider co-sponsorship of future meetings. He then presented the report of the president.

President-Elect Joy T. Luke spoke briefly on the reorganization of the project committees, and the new interest groups. Her report appeared in the ISCC News, No. 313 (May-June 1988).

Secretary Therese R. Commerford reported on the membership of the ISCC as of the first of May, 1988. Treasurer Edward T. Connor briefly summarized the report of the Treasurer and the Finance Committee. The Secretary's report and detailed reports of the Treasurer and Finance Committee will be found in this issue of the News.

The Macbeth Award for 1988 was presented to Joy Turner Luke by President Rodrigues. Mr. Hilton E. Brown read the citation. The Nickerson Service Award was presented to Ruth Johnston-Feller by President Rodrigues with Mr. Ralph Stanziola reading the citation. President Rodrigues introduced the new ISCC Directors for 1988-1991; Hilton E. Brown, James Cave and W. Nick Hale. Certificates of Appreciation were presented to retiring directors: Jack Hsia, Justin Remilson and Wolfgang Walter; project committee chairmen: Seymour Commanday, Richard Ingalls, Stephen Bergen, Walter Granville, Jacqui Welker, John F. Richardson, Peter K. Kaiser and Steven Shafer. All were thanked for their contribution to ISCC.

President Rodrigues next introduced the incoming Officers: President-Elect Hugh S. Fairman and Treasurer Philip Hunter. At this time, he called out-going Treasurer Edward T. Connor to the podium and presented him with a plaque, citing Mr. Connor's outstanding contribution to the Council and thanking him for his service over the past eight years. The gavel was then passed from out-going President Rodrigues to in-coming President Luke. She presented Dr. Rodrigues with a Certificate of Appreciation as retiring President. President Luke adjourned the meeting at 1:30 p.m.

Respectfully submitted, Therese R. Commerford, Secretary



Gavel Passes. At the close of the Annual meeting, May 9, 1988, outgoing president Allan B. J. Rodrigues gives the gavel and a congratulatory handshake to incoming president Joy Turner Luke.
(Photograph by Harry Hammond)

POSTER PAPER SESSION AT 1988 ANNUAL MEETING WAS A HIT !!!

This is the first time in the history of the ISCC that we have opened up the floor to contributed papers in the form of a poster session. I am happy to report that the session was a success and something of which we should all be proud. Eight papers were submitted. Six of them originated from ISCC individual members and the remaining two came from contributors who saw our publicity in their trade journals. It truly is a tribute to the authors and the professional job they did on their posters to make note of the fact that the room was always filled with interested observers even when the authors were not enquire to be present and other conference activities were simultaneously occurring.

Here is a brief summary of the eight poster papers that were presented. Nancy Kwaliek and Carol Lewis from the University of Texas at Austin reported on the "Human Response to the Principal Hues in an Office Environment". This was an interesting account of how interior office color affects worker mood and productivity. Subjects performed tasks in one colored office space and then were moved to another office which was either the same color or a different one. Colors that were investigated were red, blue, white, green, orange, yellow and purple. Results indicated that subjects who switched office color made more errors than those who did not. Hilton Brown from the Art Conservation Department at the University of Delaware gave a paper on the history of standards for artists' materials that spanned the years from 1938 to 1988. This poster was an excellent chronicle of the work of both ISCC project committee #37 (Artists' Materials) and ASTM D01.57 subcommittee (Artists' Paints and Related Materials). Great care and attention for detail made this poster an exquisite piece of artwork in and of itself. Hilton is to be congratulated on a meticulous job of putting it together and hopefully he will use it as a keepsake. We hope he would consider updating it as history continues to unfold in this area of artists' materials standards. Joseph Hodnick from Boston, Massachusetts presented a theory of color vision which mathematically links three stages together. The three stages are derived from the work of Land (first stage), Hering (second stage) and Munsell (third stage). The poster consisted of a very interesting diagram of the human brain and visual system to indicate the physiological processing that occurs at the level of cells and synapses. Rollie Zavada from Eastman Kodak Company gave a poster paper documenting the justification which led to the birth of non-NTSC SMPTE "C" phosphors. This presentation was very professionally done in full color featuring chromaticity diagrams comparing various phosphor set gamuts. Bob Marcus of the Munsell Color Laboratory at Macbeth and Jim Degroff of Colortec Associates, Inc., are to be congratulated for having the most interactive poster paper of our session. Conference participants were fascinated with the hands-on capability of walking up to an IBM PC, keying in some Munsell coordinates and getting back some CIE coordinates or keying in some CIE data and getting back some Munsell coordinates. We wish to thank them for going that extra mile to gather equipment so that we could have on-the-spot demonstrations. Hugh Fairman of John L. Armitage & Co. shared with us a different perspective on what the CIE color space really looks like. His poster featured representative diagrams of different views of the CIE 1931 space before the transformation to orthogonal axes. These diagrams provided a refreshing view that made us think of the

CIE color space layout in a different way other than according to the conventional chromaticity diagram. Richard and Marjorie Ingalls of Target Color Technology gave a presentation of some of their color image and products resulting from their patented process of exposing photosensitive film and paper to control hard copy color with scientific precision specified by the user. Their sample presentation was a very colorful demonstration of the broad range of colorimetric applications which can be covered by this process. Finally we would like to thank the Detroit Color Council, which is one of our most active member-bodies, for submitting a poster to represent their group efforts.

Paula J. Alessi, Papers Committee Chair

TUESDAY MORNING'S SYMPOSIUM SESSION

Speakers at the Tuesday Morning session discussed the color capabilities of CRTs and methods for their calibration. Gus Carroll reviewed the factors which should be considered when the CRT plus its control circuitry is used to prepare images for printing. To calibrate a monitor it is necessary to know the relationship between the input digital values, r, g, and b, and the voltage delivered to the guns which excite the three phosphors. If the spectral distribution of the radiance does not change with applied voltage and if the output measured on the CRT is independent of the voltage applied to the remaining guns, the relationship between r, g, b and chromaticity can be described by a linear mathematical model. Seven models were evaluated in an experiment to test that assumption. Most of the models had residual of no more than 4 to 5%. The best fit was obtained with piecewise linear interpolation. This process simplifies the computer program which converts chromaticity to r, g, b values. While the ability to display specified chromaticities is valuable, many other factors must be considered. For example, the ambient illumination level and color, and the surface characteristics of the print medium. The author discussed the problems of determining the parameter to include in an image description that will allow a printer to produce a result that looks like the monitor. He did not present an answer to this problem.

The second paper was presented by William Cowan, National Research Council of Canada. Co-authors of this paper are J. J. Renniison, and Nelson Rowell. Cowan made the prize statement of the conference, "Cathode ray tubes aren't very bright". He elaborated by saying that using a CRT to prepare an image for printing is really very simple. One measures the color appearance of each pixel on the display and produces a pixel-for-pixel appearance match on the print. He said that unfortunately we don't know how to measure the appearance of either display or print image. While we cannot measure appearance, we can measure tristimulus values. Tristimulus values do not correlate very well with appearance but they are necessary to characterize and calibrate monitors and printers. For monitors, characterization determines the input r, g, b values needed to produce specific tristimulus values. Calibration is used to set up the monitor to produce those tristimulus values consistently. Both operations require a measuring device which had adequate signal-to-noise ratio because of the small amount of light emitted by the CRT. The instrument must also accommodate the pulse nature of the CRT, have sufficiently large collection area, and correctly integrate the CRT structure. The preferred instrument is a spectroradiometer, with a multiple wavelength detector system. Because of the spikes in the phosphor

spectrum, the resolution should be approximately 2 nm, and the wavelength range should be 380 nm to 760 nm. Two systems are used to characterize a monitor, model dependent and exhaustive. Model dependent methods require few measurements but are computationally heavy. Exhaustive methods need many measurements but need minimal on-line computation. A high speed automated spectroradiometer is preferred for the latter because frequent characterization is needed to track CRT output variations caused by tube aging, temperature variation, and other sources of variation. (Dr. Cowan stated that the performance of a monitor is not correlated with its cost.) A spectroradiometer used to measure a CRT must have sufficient sensitivity and must integrate the pulse and structure nature of a CRT. According to Cowan, "Multiple detector systems outperform scanning systems by an order of magnitude."

Ricardo Motta and Roy Berns of the RIT Munsell Color Science Laboratory described a model dependent method for calibration of a CRT. (Motta recently joined the Hewlett Packard Laboratories following graduation from RIT.) The object of the authors' model is to determine CRT chromaticity from r,g,b digital values sent to the monitor. The usual modes for describing the colorimetric performance of a CRT assumes only two parameters, gamma and video voltage. According to the authors, the additional parameters of system gain and offset need to be incorporated. By incorporating these, which can be estimated using non linear optimization techniques, the authors were able to reduce the errors in predicting chromaticity by a factor of 10 or more.

Unfortunately, I did not take notes on the paper by the final authors of the morning, David L. Post and Christopher S. Calhoun of Wright-Patterson Air Force Base. From the authors' prepublication notes, I conclude that they have devised two new methods for characterizing a monitor. One system is simple, but not very precise. A more complicated system is more precise, but still not good enough for precision color work. If you are interested in more detail, write to the authors, or wait for the Proceedings to be published in the SID Journal.

"Dusty" Rhodes

PRESIDENT'S REPORT **Baltimore, 1988 May 09**

I characterized my report to you last year as "interim". While we had made satisfactory progress, there was more we had to accomplish. I believe you will agree that this Board of Directors and Executive Committee have achieved the goals we set. Two years ago when I took office, the areas we emphasized were: member-bodies, project committees and the structure of our Organization. I believe we have been successful in revitalizing all three areas.

We have worked towards more participation by member-bodies. Larry Tannas, V-P of Society for Information Display (SID) and I tossed around this concept at Toronto two years ago. He actively followed up, getting together with Nick Hale to organize this very successful joint SID-ISCC conference. We have future annual meetings planned with Federation of Societies for Coatings Technology (FSCT) and Color Association of the United States (CAUS). Recently, our past-president, Lou Graham, has been appointed member-body liaison, bringing new vigor to that task.

Hugh Fairman, the incoming President-Elect, has done an outstanding job of streamlining the project committees. Many committees have finished their work or recognized their major thrust was accomplished and no further work was appropriate at this time. These committees have been closed. The seven current committees have clearly defined purposes, manageable scopes and specific objective which can be accomplished in a reasonable time frame. Your Board of Directors has made it very clear that they are expected to accomplish these objectives and the Board will closely monitor and support them.

Our approach to the organizational structure is already paying dividends. President-elect Joy T. Luke has revised existing guidelines for written new ones for every task necessary to run this organization, properly defining responsibilities of each standing committee. Drafts are now being refined and each committee chairman will be getting a guide for his/her specific task. The By-Laws Committee, chaired by Jay Rennilson, has updated the By-Laws, removing inconsistencies. The first draft has been submitted to voting members for comment. Lastly, Joy Luke's Planning Committee has studied ways to make the Annual Meeting more dynamic, catering to the diverse needs of this Inter-Society Color Council. This has resulted in the newly formed Interest Groups and in the poster sessions to provide a forum for discussion of color ideas. I have always felt that the most interesting aspect of ISCC is this interchange of ideas. The feedback you have given me over this past day confirms that these are fulfilling their intended goals.

I am comfortable that over the last two years, thanks to the momentum started during Joyce Davenport's term, we have accomplished what we set out to do. With the help of an outstanding and enthusiastic Board of Directors and Standing Committee chairmen, and the encouragement and support of the entire membership, this administration has been able to serve the needs of the ISCC. A key person in doing this has been President-Elect Joy T. Luke. I take great pleasure in turning the gavel over to her, knowing that under her stewardship, supported by Hugh Fairman, the ISCC will continue to strengthen and excel, achieving its goals and serving its membership well.

Allan B. J. Rodrigues, Ph.D., President 1986-1988

REPORT OF TREASURER & FINANCE COMMITTEE, May 5, 1988

The financial condition of your Council remains healthy. In the calendar year 1987, income exceeded expenses by \$2,976—bringing the accumulated surplus to \$59,166.

There follows a condensed summary Income Statement. A detailed Income Statement and Balance Sheet were created by an Internal Audit Committee created by the ISCC Board of Directors to facilitate an orderly change of Treasurer at the 1988 Annual Meeting. The Audit Committee was chaired by Hugh S. Fairman, who is presently serving as Project Committee Chairman, and incoming President-Elect, Philip S. Hunter, the incoming Treasurer and Virginia Quante.

Spending (expense) in 1987 of a non-reoccurring nature amounted to approximately \$5,000. Of this, \$3558 was for a computer for the

Office of Secretary and \$1,450 as final payment for the new design Godlove Awards (thanks to Marjorie and Dick Ingalls) and 6 production awards. Total spending for the new award project was \$2,900.

It has been my great pleasure to serve as your Treasurer. I wish to thank the Officers and Directors for their support and guidance. A special thankyou goes to the present and past members of the Finance Committee—Nick Hale, Harry K. Hammond III and Charles G. Leete.

Respectfully, Edward T. Connor, Treasurer

INCOME STATEMENT - Calendar Year 1987 - Condensed Summary (Numbers are in thousands)

INCOME

13.5	Dues
6.2	Meetings (net)
13.5	Annual Mtg. Gross Inc.
13.9	" " " Exp.
(0.4)	" " Net Income
49.7	Williamsburg Mtg. Gross Inc.
43.1	" " " Exp.
6.6	" " Net Income
3.6	Investment Interest
1.1	Misc.
<u>24.4</u>	Total Income

EXPENSE

10.6	Newsletter
2.3	By-Laws
2.4	Officers, Directors, Committees
1.0	Misc.
3.6	Computer Acquisition
1.5	New Godlove Award
<u>21.4</u>	Total Expense

SURPLUS

3.0

Edward T. Connor, Treasurer

SECRETARY'S REPORT

The following table lists the number of ISCC members in the various categories of membership, as of May 1, 1988. The numbers fluctuate monthly as new members are added and others are deleted because of resignation or an unknown address.

MEMBERSHIP CATEGORY	NUMBER OF MEMBERS
IMG US	531
CAN	19
OTHER	58
IMGR (retired)	21
IMGS (student)	10
HONORARY	13
DELEGATES	95
AIC REPS.	26
MEMBER-BODY LIAISON	28
LIBRARY SUBSCRIPTIONS	24
<u>TOTAL</u>	<u>857</u>

NOTE: Many delegates and AIC representatives are also IMG. Therefore, the total is not equal to the sum of the various categories.

Therese R. Commerford, Secretary

ANNUAL REPORT ISCC PROJECT COMMITTEE 32, Image Technology

The primary activity for this committee over the past year has been through correspondence leading up to the 1988 annual meeting in Baltimore. This was one of the most well-attended meetings we have ever had. Twenty five official members were present along with twenty four guests. The room was set up conference style so that members could sit around the working table. Guests were invited to sit around the perimeter of the room as observers. This format for a workers meeting was very productive.

After a few introductions, the chairperson, Paula J. Alessi, called the meeting to order. The first order of business was to review the new purpose, scope & objective statements for this committee, which had just recently been approved by the ISCC Board of Directors. They are as follows:

Purpose: There is a need for an interdisciplinary study of the problems common to photography, printing, video display, and television relating to the rendition, measurement, and specification of color.

Scope: 1. To compile a color reproduction bibliography.

2. To maintain a current list of users needs and accomplishments with respect to calibration of video display phosphors, and display viewing conditions.

3. To design and execute some experiments to define the mapping function which would allow us to go from video display color space to hardcopy.

Objective: To compile the color reproduction bibliography within the coming year.

Paula emphasized the importance of achieving this first clearly defined objective within the one year timeframe. The second and final order of business, which lasted the remainder of the two hour session, was discussion of the color reproduction bibliography. Agreement was finally attained on the major headings that comprise the bibliography outline. Subdivisions, according to imaging system (i.e., photography, graphic arts, television video display, or combinations like video display to hardcopy), were assigned to those sections where they were needed. Several members had already begun placing literature references within this framework. Then Paula went around the table asking each member to cover specific journals in search of references which should be included in this bibliography. The subject of annotation was then discussed. Everyone agreed that annotation would be a desirable feature. However it was generally felt that achieving both placement of literature references and annotation within the next year would not be possible depending on the final size and form of this bibliography, it may not be desirable or practical to annotate it in its entirety. Perhaps this annotation issue would become a second objective for this committee to tackle after having completed the current objective.

Paula closed the session with a discussion of having an interim meeting in the fall before the 1989 annual meeting. Everyone agreed that having such a meeting would be useful. Dusty Rhodes very kindly offered to host it on the west coast in L. A. However a majority of members said that it would be more likely for them to attend a meeting on the east coast than on the west coast. Paula will use her discretion to set the date & location of the interim meeting.

Respectfully submitted, Paula J. Alessi

ANNUAL REPORT Project Committee #37, Artists' Materials & Contemporary Art

Project Committee #37 met between the hours of 3:00 and 4:30 p.m. on Sunday, May 8, 1988 at the Sheraton Inner Harbor Hotel in Baltimore at the annual meeting of the ISCC. Nine persons were in attendance when the chairman called the meeting to order. The chairman began the meeting with a distribution of the agenda and a listing of the newly defined purpose, scope, and objectives of this project committee as they had been approved by the ISCC Board of Directors at its January 23, 1988 meeting held in Clearwater Beach, Florida. These are as follows:

Purpose: There is a need to educate interested persons about the physical and chemical characteristics of contemporary artists' materials and art involving color by dissemination of current technical information.

Scope: 1. To collect technical information about contemporary artists' materials, techniques, and works of art that involve color interaction.

2. To identify what technical information is important and why it is important.

3. To define requirements for the use, display, and storage of artists' materials and art with regard to color interaction and stability.

Objectives: 1. To develop guidelines and recommendations for artists' studio lighting.

2. To develop recommendations for a basic artists' palette covering the largest practical color gamut and providing the best practical color constancy.

3. To disseminate the results of the above objectives.

A lively and productive discussion took place concerning: 1. the appropriateness of the newly defined purpose, scope and objectives of this project committee; 2. the relationship between this project committee and Interest Group III: Art, Design, and Psychology and Interest Group IV: Color Education; 3. The need for this project committee to continue if all the important work concerning artists' materials is being accomplished by the ASTM Subcommittee DO1.57 on Artists' Paints and Related Materials.

Although no vote was taken, the sense of the meeting to the chair was that the new purpose, scope, and objectives were not only appropriate but workable within the new guidelines that a project must be definable, specific, short term and produce results. It was clear from this discussion that the attendees thought the primary purpose of this project committee was educational. Since project committees are constituted to produce results whereas the function of the Interest Groups is to arrange and present a program at annual meetings there is no overlapping of functions between this committee and Interest Groups III & IV. Much of the discussion centered around the relationship between the work of this committee and that of ASTM Subcommittee DO1.57. It became clear that since the ASTM subcommittee is involved in writing standards its work does not duplicate nor obviate the educational objectives of Project Committee #37.

There were several suggestions expressed about how to get technical information about artists' coloring materials to interested persons. One such suggestion was the development of a teaching manual and/or a course outline. Several attendees commented about the importance of getting technical information to appropriate groups

such as primary, secondary, and college art educators. Another suggestion was that there is a real need to get information published about the new ASTM quality standards for artists' oil, acrylic and alkyd paints, D 4302 and D 4303, since the art material manufacturers have not, for the most part, promoted these quality standards.

The committee meeting ended with a brief discussion about the current project of writing guidelines for artists' studio lighting and basic artists' palette. The chair took down names of the attendees who expressed interest in working on these two projects. It is the intention of the chair of this project committee that these two projects will be completed by the 1989 annual meeting that is to take place in Chicago.

Submitted by Hilton Brown, chairman

REPORT FROM INTEREST GROUP II

Paula J. Alessi and Norman Burningham are happy to report that the first meeting of Interest Group II on Appearance, Vision and Modeling at the 1988 Annual Meeting was a smashing success!

The session was opened by Norman, who introduced our two speakers. The first was Fred W. Billmeyer, Jr. We asked him to give a talk on appearance. It was an excellent introduction to the challenges that we all face in trying to define and quantify the appearance of an object in its original form or as a reproduction. He defined color appearance as what colors look like as they are perceived. He emphasized that the CIE system can only be used to describe color matching situations. It tells us nothing about appearance. He suggested that color order systems, like Munsell or the OSA Uniform Color Scales, might be more useful in trying to quantify color appearance. Such color order systems are based on visual scaling experiments where the state of adaptation of the eye plays an important role. For example, the Munsell Color Atlas based on the Munsell Color System is a collection of painted samples representing equal visual perception intervals between adjacent samples for CIE standard illuminant C. The best color atlases specify the viewing illuminant and hence the state of adaptation of the eye so that they can be used optimally to study color appearance under the conditions for which their color space is defined. It is possible to characterize the appearance of an object color by trying to place it within any of these color order systems. If you can recreate the viewing conditions for the visual scaling experiments that defined the uniformity of the color order system of interest, you can calculate what its coordinates would be in that system and view your sample in relation to the physical samples that are its closest neighbors and make some judgements about its appearance. Or you can try to do your own visual experiment to place your sample within the color order system without using color calculation to aid you. If you want to predict the appearance of a color as viewed under an illuminant other than the one for which the color atlas was optimally defined, then you must perform some kind of chromatic adaptation transform.

Helson and Judd contributed to appearance studies by evaluating changes in color perception for some Munsell color chips as the chromatic adaptation of the eye changed in passing from a viewing illumination where the Munsell spacing was judged to be uniform (Ill. C) to a different illumination (e.g. CIE Ill. A). Fred also cited the more recent chromatic adaptation work by Breneman, when he was at Kodak and Nayatani from Japan. Next some of the Ralph Evans work

was cited to emphasize that the appearance of colors can change dramatically when the color of the surround is varied. Fred brought some excellent simultaneous contrast demonstrations illustrating how our eyes can get fooled when the same color stimulus is surrounded by complex patterns of different colors.

After mentioning the state of adaptation of the eye and the effect of surround, the importance of luminance level in describing the appearance of an object color was discussed. The talk concluded with a discussion of Hunt's six different kinds of color reproduction (spectral, colorimetric, exact, equivalent, corresponding and preferred). These color reproduction criteria outline rather rigid requirements yet they still don't address all the important issues. Fred reminded us that most of the appearance work has been done on single colors with a simple surround. Is it a simple translation to explain multiple colors with a complex surround? He cited Breneman's work on chromatic adaptation effects with a complex surround as one attempt to meet the challenge in extending from the simple to the complex. He also emphasized that in trying to specify appearance matches, metamerism is the biggest asset, but it is also the biggest liability. Observer metamerism can be as important as illuminant metamerism. The challenge is not only to understand the effects of observer and illuminant metamerism, but also to maximize the advantage of allowing metameric matches while minimizing the liability such matches can create. Fred concluded by coining the phrase "realistic color reproduction". The best way for an imaging system to meet the appearance challenges he outlined may be to reproduce the color appearance of an original as "realistically" as possible.

Our second speaker was LeRoy DeMarsh who shared some modeling work with us in his talk entitled, "Color Gamuts of CRTs and Film". Roy's major emphasis was on High Definition Television (HDTV). He began by defining the five color characteristics that are important for a good quality HDTV source signal. They are:

1. A broad enough color gamut to encompass future display technologies.
2. A completely defined non-linear compression function.
3. Constant luminance.
4. Being able to recover linear, full bandwidth for post production.
5. Transformability.

Next he showed a flow chart of how an HDTV production system works. The input can come from a film scanner, an electronic camera, or computer graphics. That input then feeds the HDTV electronic production/post production process, part of which is a CRT display used for monitoring the process. Finally the processed images are sent out to various distribution media such as motion picture film, current TV standards, future AVTV systems or electronic theater. The gamut discussion began with an xy chromaticity diagram showing the phosphor gamut for three different sets of reference primaries, SMPTE "C", SMPTE HDTV, and EBU HDTV, proposed for HDTV. The smallest gamut was represented by the SMPTE "C" phosphor and the largest by the EBU HDTV set. Roy pointed out that there are problems associated with these kinds of color gamut definitions, especially when we are trying to relate them to color appearance. First there is the question of how big the color gamut has to be for the particular application. Second is the problem of specifying the viewing illuminant for the gamut calculations. Most often in the television arena,

monitor white points are set up for a D65 viewing illuminant. However most of the published real surface color gamut data are presented for CIE Illuminant C (M.R. Pointer, "The Color Gamut of Real Surface Colors", *Color Res. & Appl.*, 145-155, 1980). This tied in very nicely with what we just heard from Fred Billmeyer in that it suggests the need for a chromatic adaptation transform to account for the change in the state of adaptation of the eye with the viewing illuminant difference. It also suggests that a more meaningful way of presenting color gamut data would be to compare the gamut of the imaging system of interest (in this case HDTV) to that of real surface colors. After performing a chromatic adaptation calculation, Roy showed u'v' chromaticity diagrams of Pointer's real surface color gamut compared to the gamut for the EBU primaries and for the SMPTE HDTV primaries transformed to their corresponding chromaticities for CIE Illuminant C (figures 3 and 4). A third problem in the definition of color gamut is how to account for the viewing conditions. Television is viewed most often in a dim or darkened room. We know from the work of Ed Breneman that when images are viewed in a dark surround, they appear lower in contrast than when they are viewed in a normal light surround. The dynamic range from white to black decreases in a dark surround because the whites and light colors appear darker and the blacks and other dark colors appear lighter. This amounts to an overall system gamma adjustment. Then he cited Bartleson's work defining psychoquantitative Lightness, L^{**} , as being the closest correlate to the appearance phenomenon. After having provided us with the necessary background, Roy described the step by step process he follows to compute a more meaningful color gamut for an imaging system than an xy chromaticity gamut calculation. First a hue selection is made in CIE $L^* u^* v^*$ space. Given that hue position, he selects a metric lightness (L^*) position and the metric chroma (C^*) of the color limit from Pointer's real surface color data. Next he computes the XYZ tristimulus values corresponding to that metric hue, lightness, and chroma position in CIE $L^* u^* v^*$ space. These should be in terms of CIE Illuminant C because that is the illuminant Pointer used. Then he uses the chromatic adaptation transforms to compute the corresponding tristimulus values (XYZ) for CIE Illuminant D65. Recall that illuminant D65 is used as a more common white point for setting up TV monitors.

Then the tristimulus values are corrected for the dim or dark surround effect. This amounts to adjusting Y for a system gamma greater than 1.0 and a rescaling of X & Z to maintain the same chromaticity. As Fred Billmeyer pointed out earlier, Hunt would characterize this type of analysis as corresponding color reproduction. Next he computes the RGB phosphor amounts or the cmc dye amounts, depending on the imaging system of interest, and checks those against the previously defined limits. If the limits are not reached or exceeded, metric chroma is added to the color and the process is repeated. This iterative process continues until the direction of the metric chroma adjustment changes, indicating that the limit has been reached or exceeded. At that point final color coordinates are computed in CIE $L^* u^* v^*$ space. Since the world of color science lacks a true color appearance space, this technique does the next best thing. It attempts to account for certain appearance phenomena, such as chromatic adaptation and dark surround, by adjusting the tristimulus values according to studies that have characterized these effects. It then maps those tristimulus values into CIE $L^* u^* v^*$ color space, which is a perceptually more uniform space for small color differences.

Roy showed results of his gamut calculations in the form of vertical L*,C* slices through the color solid. Examples included how gamma, minimum film density and signal level can affect the gamut of an imaging system for a red hue angle of 10 degrees, a green of 130 degrees and a blue of 260 degrees. Roy showed a comparison of the color gamuts for current TV production, projected motion picture film, SMPTE HDTV production, and real surface colors from the Pointer data (figures 5, 6 & 7, respectively). In every case the SMPTE HDTV production system had the largest gamut. In summary, Roy guided the audience beyond the additive mixture triangular gamut type comparisons in y or u'v' chromaticity spaces. He provided the groundwork for helping us to think about gamut comparisons that would try to better account for color appearance phenomena such as viewing illuminant, surround, and chromatic adaptation effects.

Paula concluded the session by leading a discussion of the scope and future direction for Interest Group II. The scope was stated as follows: Interest Group II will serve as a forum for academic and industrial participants to explore and discuss state-of-the-art technology in the areas of appearance, vision and modeling. She outlined the following future direction for each of the three areas:

Appearance: 1. Measurement Techniques for Appearance Specification

2. Appearance Translation for Imaging Systems (e.g. Film/CRT/Printed Page)

3. Color Appearance Spaces (e.g. from Hunt or Nayatani)

Vision: 1. Most Current Color Vision Models

2. Work along with CIE Division 1

Modeling: 1. Color Reproduction Modeling

2. Multiple Systems in the Color Reproduction Chain (e.g. CRT/Film/Paper)

It became obvious that one cannot talk about color reproduction modeling without talking about appearance. Also color Vision models are part of both the vision and modeling sections. It seems as though it is not possible to deal with one of these topic areas without including at least one of the other two. Each one of these topics in and of themselves is very broad, but they are also very inter-related. Thus Interest Group II will restrict itself to subject matter that deals with the inter-relationships among the three topic areas in order to narrow down the broad scope of each one. Contributed and invited papers will continue to be solicited. Next year as a kickoff to this new operating concept, we will try to have a program on color appearance spaces including speakers to discuss current theories and practical applications of those theories.

Submitted by Paula J. Alessi

INTEREST GROUP III Art, Design and Psychology

The newly organized Art, Design and Psychology Interest group presented its first program at the 1988 Annual Meeting at Baltimore, Maryland. The program included three guest speakers each representing one of the three interest areas:

Art: Mr. Dan Gorski, Chairman, Painting Dept., Maryland Institute, College of Art, "Color for the Artist: Personal and Teaching". May 8th.

Design: Dr. Cynthia R. Field, Director, Office of Architectural History and Preservation, "Children's Room at the Smithsonian". May 9th.

Psychology: Dr. George Brainard, Dept. of Neurology, Jefferson Medical College, Philadelphia, "Physiology and Color". May 9th.

Mr. Torsi spoke directly to the use of color in his work and exhibit slides of his paintings and sculpture. Mr. Torsi's knowledge of color theory was evident in his work, yet he made a point of expressing his attitude that an artist cannot be bound strictly by theory and that the artist's own intuitive sensibility should also enter into his decision making. His most recent paintings involve the use of metallic pigments which create a color change and luminosity absent from his earlier work. There was discussion concerning the issue of permanency of artists' materials and pigments. Mr. Gorski felt that an artist should make a reasonable and responsible effort at using materials that are of high quality and permanency without interfering with freedom and the creative process.

Dr. Cynthia Field, Director of the Office of Architectural History at the Smithsonian Institution in Washington, addressed the Interest Group on May 9. Dr. Field's most recent work has been centered around the restoration of a children's room dating from the turn of the century. The room was carefully planned and color, light, and design were paramount to the creation of a child's curiosity and sense of wonder observing the uniquely displayed exhibits. The room's color scheme was primarily a yellow-green in several different values with generous touches of gold leaf and the luminous blues and purples of the peacock feather. There was no artificial light in the original installation. The beautifully restored children's room will serve as a reception room in the future at the Smithsonian Institution.

Dr. George Brainard, Department of Neurology, Jefferson Medical College, Philadelphia, Pennsylvania, presented a lecture and slide demonstration of his work with animals (hamsters) and light color deprivation. It has been determined in his studies that the level of the hormone melatonin is directly related to the amount of light exposure experienced by the hamsters. It is his hypothesis that similar reactions take place physiologically in the human, i.e., depression and stimulation directly relate to exposure to light and color. Dr. Brainard is Co-Chair with Magenta Yglesias of Project #45 Workshop Committee for the Study of Physiological and Psychological Response to Color in Humans. Members of this committee are acutely interested in the progress of this color research.

The Chairpersons are pleased to report that each lecture was well attended and the lively discussions following the lectures provided new and continuing council members the opportunity to implement our new interest group goal of providing a forum for new ideas and directions. These presentations were all of high quality and represent the first step in a continuing program of speakers, workshops, presented papers and other events involving professionals within and outside of the ISCC involved in color.

The general session held on May 9th introduced Interest Group III to current and new members. The stated objectives and goals were discussed along with introductions and professional backgrounds of the presiding chairpersons and those individuals attending the meeting. Those attending were requested to submit to the chairpersons specific plans and proposals for upcoming meetings and also possible project committees, research papers and workshops. As hoped, the Interest Group session attracted a wide range of backgrounds from new

members and a number indicated interest in initiating upcoming projects.

The first program for Art, Design and Psychology Interest Group III set a precedent for quality programs in the future. There was concern for the overlapping of related groups and sessions and it is expected that this scheduling situation will be adjusted for the next annual meeting.

Magenta Yglesias and Wade Thompson, co-chairpersons.



Award Recipients. At ISCC Annual Meeting in Baltimore, May 9, 1988, Joy Turner Luke (left) receives Macbeth Award and Ruth Johnson-Feller receives Nickerson-ISCC Award. (Photo by Harry Hammond)

PRESIDENT JOY T. LUKE RECEIVES 1988 MACBETH AWARD Citation by Hilton Brown

The Macbeth Award Fund was established by Norman Macbeth, Jr. in honor of his father, Norman Macbeth, who was president of the Macbeth Daylighting Corporation and a founding member of the ISCC. Norman Macbeth, Jr. was a former long-term treasurer of the ISCC and former Chairman of the Board of Kollmorgen Corporation which included in its member divisions the Macbeth Color Group. This award is presented biennially, in even numbered years.

The Macbeth Award is to be given for one or more recent outstanding contributions in the field of color. It is to be presented to a member or a former member of the Council. The contributions shall have advanced the field of color, interpreted broadly, as in the objectives of the Council defined by our constitution. The merit of a candidate shall be judged by his or her contributions to any of the fields of interest related to color, whether or not it is represented by any of the Member-Bodies. The contribution to color may be direct, it may be in the active practical stimulation of the application of color, or

it may be an outstanding dissemination of knowledge of color by writing or lecturing. The candidates for the Macbeth Award need not have been active in the affairs of the Council.

It is a great pleasure to announce that our president-elect, Joy Turner Luke has been selected as the recipient of the 1988 Macbeth Award. In my opinion, the Macbeth Award Committee could not have made a better choice for the recipient of this important award.

Joy's contribution to the development and publication of quality and health standards for artists' paints and related materials has been immense. I will give you a brief introduction to her ongoing contributions concerning this subject. On April 18, 1977 when Ruth Johnston-Feller was chairman of ISCC Project Committees, the ISCC Project Committee #37 on Artists' Materials was formed sponsored by National Artists' Equity Association and chaired by Joy.

The first project was a study of the pigments used in the manufacture of artists' paints as well as the labeling practices used by these manufacturers. The late Henry Levison, owner of Permanent Pigments Artists' Material Company and Joy (both members of the National Bureau of Standards Standing Committee on Artists' Paints), working closely together were preparing for a revision of the obsolete NBS Commercial Standard CS98-62 on Artists' Oil Paints. Due to technical advances in testing methods beyond the scope of CS98-62, it was suggested by Nick Hale that contact should be established with the paint committee of the American Society for Testing and Materials (ASTM). Subsequently, an ASTM subcommittee on artists' paints and related materials was established with sponsorship by National Artists' Equity Association and chaired by Joy.

In 1979 the Bureau of Standards changed its policies on voluntary product standards, halting work on a revision of CS98-62. Since ASTM provided important technical expertise as well as excellent supervision on the development of standards it was decided to turn the revised CS98-62 into an ASTM specification. Under Joy's able leadership, the membership of the ISCC Committee #37 and the ASTM D01.57 Subcommittee became virtually identical. It was composed of artists, art conservators, analytical chemists and color scientists as well as artists' paint manufacturers and their chemists.

Due primarily to Joy's chairmanship of these two committees, the following Standards have been published by ASTM: D 4302 "Specification for Artists' Oil and Acrylic Emulsion Paints", D 4303 "Test Methods for Lightfastness of Pigments Used in Artists' Paints", and D 4236 "Practice for Labeling Art Materials for Chronic Health Hazards". Work continues to the present day under Joy's able and persuasive leadership on revisions to these standards and new standards are currently being written concerning lightfastness testing of art materials by artists, quality specifications on watercolor and gouache paints, and pencils.

Joy is a painter, lecturer, writer and teacher of color and artists' paints to painters, craftspersons, interior designers, and other professionals and students. For a number of years she has offered intensive workshops on color and artists' paints at her Studio 231 in Sperryville, VA. Beginning in 1960 she exhibited her paintings in juried exhibitions in the greater Washington, D.C. area including the following institutions: the Baltimore Museum of Art, the Smithsonian Institution, and the Corcoran Gallery of Art, among others and received several awards. She gave three one-person shows of her work at the Studio Gallery in Washington, D.C. and her paintings were handled by several private galleries. As a speaker she has lectured on color and

artists' paints at many institutions including Georgetown University, the Smithsonian Institution, the Winterthur Museum, the University of North Carolina at Greensboro, the Pratt Institute, and Lawrence Livermore Laboratory. She has lectured for the Principles of Color Technology course at Rensselaer and appeared as principal speaker in the seminars, "Color and the Computer", produced under the auspices of the Educational Resources Associates, Inc., sponsored by Polaroid. She has presented three invited papers on color at the ISCC Williamsburg Conferences. Joy has presented professional seminars on color in the fields of design and graphic arts for the Smithsonian Resident Associates Program, lectured for the Washington Chapter of the Optical Society of America, the Illuminating Engineering Society, to the "Color Me Beautiful" groups, and so on. As a writer, she has published numerous articles and book reviews over the past ten years about color and artists' materials. These articles have appeared in such professional journals and other publications as "Color Research and Application", "American Artist Magazine", "Art Workers News" and "National Artists' Equity News" among others. Working with the late Dorothy Nickerson, Nick Hale, and others, Joy has been active in the preparation of a three-dimension model of the Uniform OSA Color Scales.

As you all know, Joy has been a very active member of the Council. Besides being the founding chair of Project Committee #37 on Artists' Materials, she was project committee coordinator, served a term as a member of the Board of Directors and was 1985 Annual Meeting Program Chairman before being elected our president-elect. She has served as a trustee to the Munsell Foundation, the advisory boards of the Munsell Color Laboratory at Rochester Institute of Technology and the Mayer Center for Artists' Techniques at the University of Delaware.

Joy studied art and color at Rollins College in Winter Park, FL. She also studied at Southern Methodist University, Dallas, TX and at American University, Washington, D.C. She studied the technical aspects of color at Rensselaer Polytechnic Institute and Hunter Lab. For her work on the development of ASTM standards, Joy was the 1981 recipient of the Henry A. Gardner Award of the American Society for Testing and Materials. In 1986 she received a plaque for achievement in color and artists' materials from the Art and Craft Materials Institute, National Artists Equity Assn., National Art Materials Trade Assn., and the National Paint and Coatings Assn.

As our recipient of the 1988 Macbeth Award, I can think of no person more deserving than Joy Turner Luke, whose ongoing contributions to the advancement of the field of color are a true embodiment of the principle of the ISCC; i.e., the integration of art, science and industry in the pursuit of the understanding of color.

RUTH JOHNSTON-FELLER RECEIVES THE NICKERSON ISCC SERVICE AWARD

The 1988 Nickerson Service Award was presented to Ruth Johnston-Feller at the ISCC Annual Meeting in Baltimore, Service Award Committee chairman, Ralph Stanziola cited her many years of service to ISCC, particularly with the Project Committees and in organizing conferences. The Nickerson Service Award was established in 1980 by the ISCC Board of Directors to be awarded for "outstanding long-term

contributions towards the advancement of the Council and its aims and purposes".

By the very nature of the criterion for the award, a comprehensive listing of the activities on which the selection was based, would be much too long for recitation after lunch or for publication here. However, we would be remiss if we failed to remind you of some of Ruth's many contributions to the Council.

Ms. Johnston-Feller has been an active member of several project committees, chaired the Problems committee and revised the Project Committee Chairman's Guide still in use today. She chaired Project #24: Catalog of Color Measuring Instruments. Such a catalog was never published—the changes in instrument design at the time were so rapid that any effort was obsolete before it was completed. However, the necessary preamble to this effort, "Color Measuring Instruments: A Guide to their Selection" (J. Color and Appearance, 1, No.2, p. 127) which she published in 1971 still stands as one of the few such guidelines.

Ruth organized the first Symposium on Color and Appearance Instrumentation (SCAI) ten years ago when she chaired the Federation of Societies for Coatings Technology delegation to the ISCC. There had never been such a symposium; symposia were the province of the individual coating societies—the National Federation was not supposed to compete. It took her two years to convince the Federation Board that for this very specialized subject, this was the proper forum.

The format of lectures, hands-on workshops, and intimate social occasions established then, continues on a periodic basis today. SCAI is co-sponsored by the Federation, ISCC, and the Manufacturers Council on Color and Appearance.

Ms. Johnston-Feller worked with her husband Dr. Robert Feller on the ISCC 1986 Williamsburg Conference "Colors of History". They have already started work on a conference on lightfastness planned for Williamsburg in 1991. Outside of the ISCC she has taught many color courses, further contributing to the aims of ISCC.

Presentation of this Award is the public expression of our sincere appreciation of Ruth's many and lasting (and continuing) contributions to the aims and purposes of the Inter-Society Color Council.

GODLOVE AWARD

It is time to nominate candidates for the Godlove Award, the most prestigious award offered by the Inter-Society Color Council (ISCC). This Award is usually presented biennially in odd numbered years. The Godlove Award was established in 1955 in memory of Dr. I. H. Godlove. It is presented to a member or former member of the ISCC for contributions to the field of color.

Candidates will be judged by their contribution to any field of interest related to color whether or not it is represented by a Member-Body. The candidate's contribution may be direct, i.e., it may be in the active practical stimulation of the application of color. It may be an outstanding dissemination of knowledge of color by writing or lecturing, based on original contributions by the nominee. Candidates need not have been active in the affairs of the ISCC. All Candidates must have had at least five (5) years experience in their particular field of color.

The first recipient of the Godlove Award was Deane B. Judd in 1957 followed by Ralph M. Evans in 1959, Dorothy Nickerson in 1961 and in each odd numbered year thereafter through 1987.

For your convenience, an insert to be used as a nominating form is included with this newsletter. Time is short, please forward your nominations to the Godlove Award Chairman A.S.A.P., by August 15, 1988 if at all possible. Send your completed nominating form to:

Linda Lewis Taylor
Godlove Award Committee Chairman
P.O. Box 235
Sperryville, Virginia 22740

NEWS FROM OTHER ORGANIZATIONS AND MEMBER-BODIES:

United States National Committee of the CIE (USNCIE); China-North American Daylighting Conference

A joint daylighting conference sponsored by the Chinese and North American lighting communities will be held November 7-9, 1988 in the Beijing Scientific Hall, Beijing, China. The subject areas are:

1) Daylighting Climate, 2) Daylighting Design and Calculations for Buildings, 3) The Balance Between Daylighting and Electric Lighting in Buildings, 4) Application of New Materials and Technology, 5) Scale Model Testing and Field Measurement for Daylighting Research, and 6) Maintenance and Management of Daylighting Equipment. Information is available from James E. Jewell in San Francisco at (415) 282-3135 or at IESNA, 345 East 47th Street, New York, NY 10017 (212) 705-7916.

American Society for Testing and Materials (ASTM)

The ASTM had meetings which followed directly after the ISCC Annual Meeting in Baltimore this May. The following is a brief summary of their activities. ASTM Committee E-12 on Appearance of Materials is involved in many areas of interest to ISCC. The scope of these activities is alluded to in the titles of its subcommittees which are listed here with the names of their chairmen in parentheses:

1) Definitions and Terminology (Billmeyer), 2) Spectrophotometry and Colorimetry (Hammond), 3) Geometric Properties (Johnson), 4) Planning (Johnson), 5) Publications (Hunter), 6) Appearance of Displays (Rich), 7) Color Order Systems (Hale), and 8) High Visibility Materials (Venable).

The work of the Subcommittee on Definitions culminates in E284, Standard Definitions of Terms Relating to Appearance of Materials, published since 1966. Nearly every year consideration is given to adding or revising terms used in or related to the field of appearance evaluation. What began as a hundred or so definitions of basic terms has been expanded many times and only a few terms have been removed over the years. Thirty-six newly approved terms will appear in the 1988 edition of the list, and 125 more have been balloted to determine if they should be included and if the members of the

subcommittee approve the proposed wording of each definition. ISCC members Fred Billmeyer and Robert Marcus have spearheaded the drive to expand and improve the list and the wording of the definitions.

The Subcommittee on Spectrophotometry and Colorimetry has also been very active this past year, due in large measure to the effort of Fred Billmeyer in providing drafts of needed new methods for Bidirectional, Sphere Reflectance, and Sphere Transmittance Spectrophotometry as well as Tristimulus Filter Colorimetry and a Practice for Reducing Variability in Colorimetric Results. A proposed revision of E 308-85, Standard Method for Computing the Colors of Objects by Using the CIE System, has been drafted and is being reviewed by a task group. Small but important revisions of E 1164-87, Practice for Obtaining Spectrophotometric Data for Object-Color Evaluation, have been proposed and approved. Method D 2616-67, Evaluating Change in Color with a Gray Scale, has been revised in title and in content. The title is now Method for Evaluation of Visual Color Difference with a Gray Scale, because the method can be used for visual evaluation of any color difference from whatever cause and not just a change in color such as that caused by fading. An old practice is also undergoing revision, namely E 369-66, Practice for Preparation of Reference White Reflectance Standards.

Since the ISCC Annual Meeting in Baltimore was held jointly with the Society for Information Display (SID), it is a good time to note that the Appearance of Displays Subcommittee of E-12 works closely with members of the Society to try to develop appearance standards for displays. This is not an easy task, but progress is being made. A proposed practice on spectroradiometry of displays has been drafted. A proposed practice on colorimetry of sources and illuminations is needed. A method for spectral and colorimetric characterization of visual display units is also needed. Finally a method is needed for spectroradiometric characterization of natural and artificial daylight illuminators. The subcommittee is planning on working closely with a committee of the Society of Motion Picture and Television Engineers that has similar goals and objectives. Reference should be made to CIE Publication No. 63 on Spectroradiometry and to the recent NBS special publication of Spectroradiometry. The Subcommittee on Color Order Systems has recently drafted a proposed practice for specifying color by the OSA-UCS system. Due to the need for standard test methods for bidirectional reflection functions and increased areas of interest, two new subcommittees have been created. One completely new one has the designation of E 12.09 Scattering, and will be chaired by Thomas A. Leonard. The other subcommittee was split off of subcommittee 12.03 and will have the designation E 12.10 Retroreflection. It will be chaired by Robert DeJaffe. A couple of other items should be noted. Several of the ASTM Materials Committees such as Paints and Plastics have subcommittees dealing with optical properties including color. Finally this year the physical dimensions of the pages in the Annual Book of ASTM standards will be expanded from 6 x 9 inches to just under 8 1/2 x 11 inches.

Harry Hammond

Detroit Colour Council (DCC)

The DCC held the tenth in a series of annual panel conferences, "Automotive Color Coatings", in May, 1988. This was a follow-up to

a similar DCC program in 1983. The earlier program had emphasized development of products to meet stringent requirements whereas the recent update summarized the improvement in quality, the development of cost-efficient systems and the prospect for improvement in both areas. The symposium was moderated by Ken Kinzler of BASF. Attendance was approximately 290.

Joseph Piazzon of General Motors described the continuous process improvement necessary to achieve customer satisfaction. John Young of Ford summarized the TGW/TGR (things gone wrong/things gone right) data accumulation and showed videotapes of customer interviews. Roy Sjoberg of Chrysler stressed the need for full communication between the supplier and auto company. He indicated the need for supplier input on color control and development of plastic molded-in-color parts.

James Wolever of Honda America summarized their color measurement development for controlling matching parts from the U.S., Canada and Japan. Dr. Klaus Herrmann of Daimler-Benz described the European standards for environmental control and detailed efforts of a high priced luxury car manufacturer to maintain a superior finish.

A lively question session went overtime and ranged from use of colored primers to the need for in-plant color measurement to the prospects for coatings suppliers operating the auto paint process. The panelists affirmed no further plans to utilize lead containing chemicals.

The symposium was organized by general chairman Richard Hamilton and DCC president James Keiser.

Submitted by W.V. Longley

Federation of Societies for Coating Technology (FSCT)

The FSCT is pleased to announce that Prof. Dr. Werner Funke, Professor for Polymer chemistry at the University of Stuttgart, West Germany, will present the Joseph J. Mattiello Lecture during the 66th Annual Meeting of the Federation, to be held at McCormick Place North, Chicago, IL, on October 19-21, 1988.

Prof. Dr. Funke's presentation, "Microgels—Intramolecularly Crosslinked Macromolecules—Potent Components of Organic Coatings", will be offered on Friday, October 21.

The lecture commemorates the contributions of Dr. Mattiello, who was instrumental in expanding the application of the sciences in the decorative and protective coatings fields. Dr. Mattiello, who served as President of the Federation in 1943-44, was Vice President and Technical Director of Hilo Varnish Corp., Brooklyn, New York, when he died in 1948.

The lecturer is chosen from among those who have made outstanding contributions to science, and is selected to present a paper on a phase of chemistry, engineering, human relationships, or other sciences fundamental to paint, varnish, lacquer, or related protective or decorative coatings.

The theme of the Federation's Annual Meeting is "Performance and Compliance: The Challenge Intensifies". This theme underscores the impact of regulatory restrictions on the coatings industry, which must respond to the dual challenges of producing quality products while meeting increasingly restrictive compliance standards. Programming, to be held at McCormick Place-North Hall, will focus on such

areas as corrosion protection, aerosol coatings, "high tech" coatings research, and major regulatory issues affecting coatings formulation and manufacture.

Program Chairman Richard M. Hille, of General Paint & Chemical Co., Gary, IN, and his committee are developing a schedule of presentations which will cover timely issues, including:

*Corrosion Seminar—"Regulation and Its Effect on Corrosion Protection"

*Manufacturing Seminar—"Productivity Measurement in Coatings Manufacture"

*Room Award Competition Papers

*Constituent Society Papers.

Serving on the Program Committee are: George R. Pilcher (Vice-Chairman), Hanna Chemical Corp., Columbus OH; Adrian Adkins, Olympic Homecare Products Co., Pleasanton, CA; Jay Austin, Halox Pigments Corp., Hammond, IN; Gary Gardner, Tnemec Co., Inc., N. Kansas City, MO; Richard J. Himics, Daniel Products Co., Jersey City, NJ; Gus W. Leep, Seymour of Sycamore, Inc., Sycamore, IL; and Joseph P. Walton, Jamestown Paint and Varnish Co., Jamestown, PA.

Advance registration is available for \$50 for members and \$65 for non-members. Fee for spouses' activities is \$35 in advance.

Also there will be a special advance registration fee of \$25 for retired members and their spouses.

On-site registration will be \$60 for full time and \$40 for one day for members. Nonmember's fees will be \$75 for full time and \$50 for one day. Spouses' activities will be \$45 on-site.

Registration forms were mailed to members in April.

Federation headquarters will be the Chicago Hilton. Other cooperating hotels will be: Hyatt Regency Chicago, The Congress, Palmer House, Essex Inn, Best Western Inn, Days Inn, and McCormick Center Hotel. All housing will be processed by the Chicago Convention Bureau, which will accept only the official housing form furnished by the Federation, which was mailed to all members in April.

For more information contact the Federation at 1315 Walnut Street, Philadelphia, PA, 19107 - 215/545-1506 - 1507.

COLOR AWARD EXHIBIT

The Eighth Annual Faber Birren Color Award Exhibit for creative expression with color was announced for 1988 by the Stamford Art Association of Stamford, Connecticut. Entries could be in any art medium and had the form of 35mm slides. These slides had to be submitted by July 29. Accepted work is to be delivered on September 6. The Exhibit will then be held at the Townhouse Gallery of the Stamford Art Association, 39 Franklin Street, Stamford, Connecticut 06901 from September 18 through October 30.

The juror is Lisa Dennison, Assistant Curator of the Solomon R. Guggenheim Museum of New York. First award will be \$1,000. The Stamford Art Association will make three additional merit awards of \$250 each, plus two further Bob and Joyce Jones awards of \$150 each.

For the Seventh Annual Exhibit of 1987, entries came from all U.S. states but two, making the show a national one. Recognition has thus increased over the years. This is probably the only award event in the U.S. art world devoted to special emphasis on color.

COLOR RESEARCH AND APPLICATION, IN THIS ISSUE

Volume 13, No.4, July/August, 1988

Perception of large color differences has always presented conceptual problems. How does one compare in a meaningful way a difference between a yellow and a red to that between a turquoise and a navy blue? In "Large Colour Differences Measured by Spontaneous Gestalt Formation", Peep Stalmeier and Charles de Weert propose an ingenious new method using a star of David design with the perceptual criterion being the triangular Gestalt formed and appearing to point left or right. When evaluating their results against those predicted by color-difference formulas they find a modified CIELUV formula to give best correlation for equal-lightness colors, with the CIELUV and CIELAB formulas being comparable for colors of different lightness levels.

Is achromatic neutral? Conventional wisdom says so. It appears to be different at least for wavelength discrimination. In "A Neutral Background for the Measurement of Spectral Sensitivity", Ken Fuld, Robert Daning, John Sparrow, and Carolyn Slade show that a background that delivers an equal number of light quanta at all wavelengths to the receptors (a field having a saturated blue appearance) is neutral by providing a balanced state of adaptation in experiments to determine the spectral sensitivity of the visual system.

Imagine the highly instrumented cockpit in a fighter plane. Many displays vie for the attention of the pilot who must make split-second decisions on the basis of the displayed information.

What are the best colors for displays so that small symbols can be rapidly and accurately located in a complex visual environment? The husband-and-wife team of Robert and Ellen Carter have investigated this matter and have found color difference, surround, and luminance to be the important factors as described in "Color Coding for Rapid Location of Small Symbols".

Several new interpretations of the Munsell System have appeared in recent years, a number of them in Japan. In "Accuracy of Munsell Notations in Two Japanese Color Order Systems", Fred Billmeyer and his former student Glen Loppnow report on their investigation of the accuracy with which these new interpretations represent the original design.

The practice of instrumental spectrophotometric reflectance measurement has become very extensive. Responsible technicians in larger corporations having multiple instruments or those dealing with customers that also make measurements are often bedeviled by the lack of agreement between data obtained for samples measured on different instruments, even of identical design. The variations are often due to small systematic differences between instruments. In "Empirical Modeling of Systematic Spectrophotometric Errors", Roy Berns and Kelvin Peterson describe a powerful method for correcting such errors to arrive at substantially improved performance.

The accurate determination of Tristimulus values continues to be a lively topic. In order to arrive at the most meaningful results the summation interval for the calculation must take, among other things, into consideration the measurement bandpass, i.e., the width of slit used to determine the reflectance factor at a given wavelength. Ideally,

the bandpass is zero, i.e., the measurement represents only exactly the nominal wavelength. This, however, is impossible. In "A Simple Method for Correcting Radiance Data for Bandpass Error", the father-and-son team of E. I. and R. E. Stearns describe how approximate zero-bandpass data can be calculated from instrumental data so that in the calculation of tristimulus data the bandpass error can be significantly reduced.

The need of artists to understand and use a color order system is somewhat controversial. Several of these, however, have been developed by artists, e.g. the Munsell System. Artists have also recommended the OSA-UCS system. In "An Artist's Preference for the Pope Color System", Ethel Hila strikes a blow for a system not widely known anymore.

Rolf Kuehni, Editor, Color Research and Application

INTERRELATION OF FACTORS AFFECTING TOTAL APPEARANCE

Mr. John Hutchings, member of project committee #33 from Bedford, England, prepared a chart showing the interrelation of Factors Affecting total Appearance. It is dated 24 December 1986. I think it is one of the best things to come from the committee and is reproduced on the following page.

Walter C. Granville, June, 1988

Note From the Editor

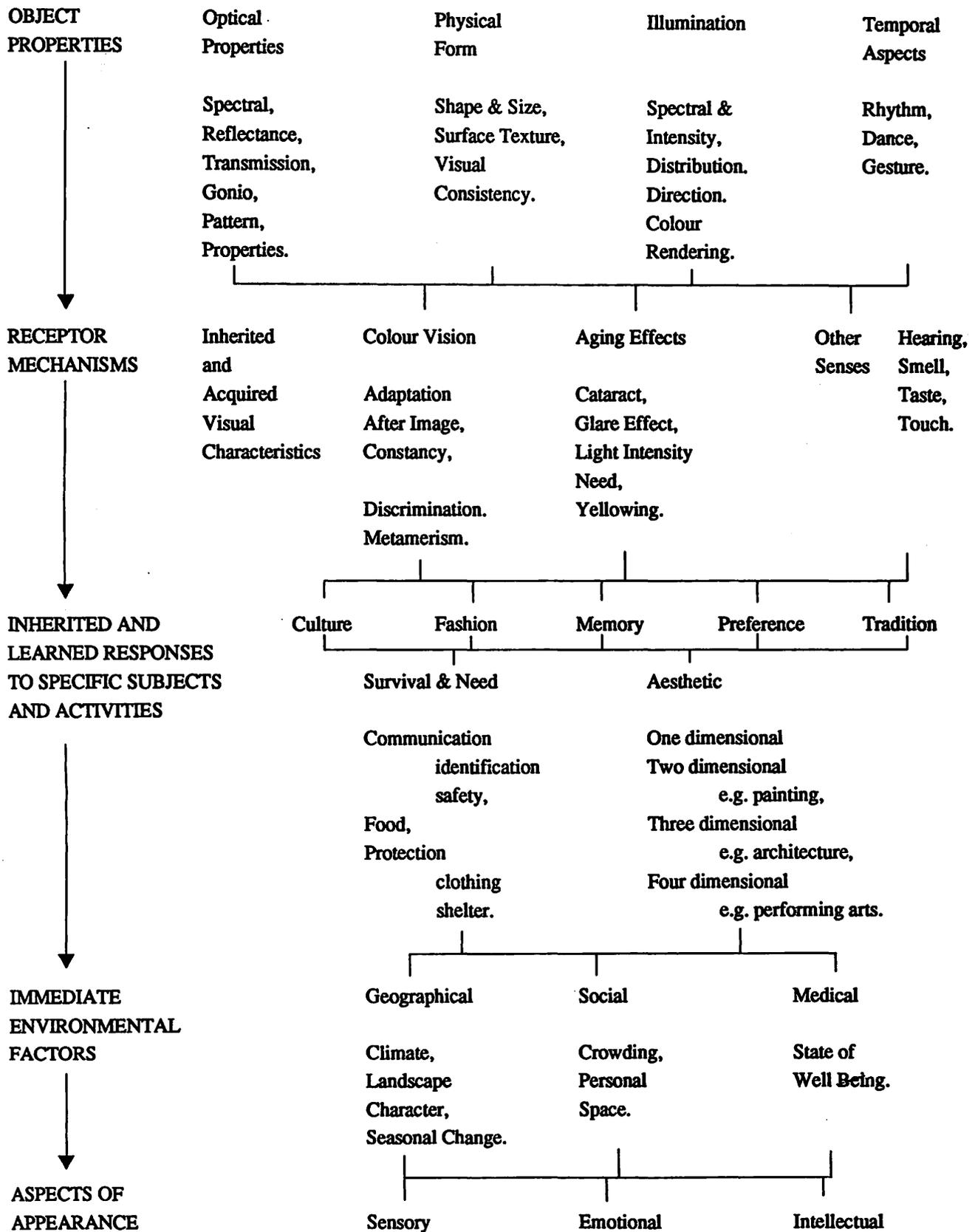
Material produced on an IBM or compatible computer can now be mailed to the editor on a floppy disk, or transmitted by modem. This will speed up the editing process.

Non-IBM-compatibles can send information by modem as ASCII text files.

Send materials for publication to:

Mrs. Bonnie Swenholt
5717 Gulick Road
Honeoye, NY 14471
(716) 229-5925

FACTORS AFFECTING TOTAL APPEARANCE



HENRY W. LEVINSON: A PERSONAL TRIBUTE

The art material industry, artists and the Inter-Society Color Council have lost a major figure. Henry W. Levison, who received the prestigious Macbeth Award in 1982 for his work on fading in artists' paints, died on April 22 in Hallandale, Florida.

Henry Levison was born on May 5, 1906 in Cincinnati, Ohio. He earned a Master of Arts degree in chemistry from the University of Cincinnati and while there became interested in permanent artists' colors through contact with Dr. Martin Fischer. Dr. Fischer lectured on the need for artists to be aware of, and have available, colors that will last for hundreds of years. Fischer also authored a book, "The Permanent Palette", on the subject.

Henry's father manufactured varnishes and inks and Henry began his career working there, but his interest in the longevity of artists' paints and contact with local artists led him in 1933 to use his few thousand dollars to establish his own company to manufacture artists' paints. He was 27 years old. He named the company "Permanent Pigments" and built it into one of the major art material companies in this country before selling it to Binney & Smith and retiring in 1971. He produced paints that were permanent, lightfast, accurately labeled and popularly priced.

He was deeply respected within the art material industry for his managerial and marketing abilities, but he retained his chemist's interest in pigments and vehicles. He was elected to the Art Material Hall of Fame by the Art Material Trade Association and made a Member in Perpetuity. For more than 50 years he was a member of the American Chemical Society and the Federation of Societies for Coating Technology and was made a Fellow of the American Institute of Chemists. Through these busy years he managed to conduct some lightfastness tests and published the information for the benefit of artists and the industry.

In 1939 under the auspices of the U.S. Bureau of Standards, manufacturers, conservators and artists began meeting to develop a quality standard for artists' paints with strict labelling requirements. Henry participated in the development of NBS CS98 published in 1942 and served on the Standing Committee that revised it in 1962. By the time of the revision acrylic emulsion artists' paints were on the market along with a flood of new pigments that had not been evaluated in the tests conducted in 1938-1939 at the Fogg Museum that formed the basis for both versions of CS98. So CS98-62 was behind the times when it was published and rapidly became obsolete.

This was a concern to Henry because he was always open to new ideas and wanted to see products improve as technology made it possible. He had formulated and marketed the first complete line of acrylic emulsion paints that handled well. In fact, his line of acrylic paints, Liquitex, was so popular that after Binney & Smith purchased the Permanent Pigment company they changed the name of the line of oil paints from "Permanent Pigment Oil Colors" to "Liquitex Oil Colors". Thus an historic name in oil paints was lost and a name invented especially to indicate the new acrylic paints, replaced it.

Other examples of innovation were a line of superb oil paints using sun thickened linseed oil as the vehicle marketed in the 1940's, and his introduction in the 1960's of a line of acrylic paints mixed to match colors in the Munsell color system. He called the latter Modular Colors and although they simplified and speeded up the iterative

process of mixing paints for the artist, they were only moderately successful until Binney & Smith gave them advertising names, such as "Light Portrait Pink" and "Vivid Lime Green". To their credit Binney & Smith retained Henry's excellent pigment identifications also.

With his interest in new products, Henry was concerned that the obsolete CS98-62 was stifling progress. When he retired in 1971, he established Colorlab in Hallandale, Florida, and returned to being a chemist and technician. He purchased pigments that were advertised as being lightfast, formulated them into oil and acrylic paints and began lightfastness tests. Since he believed that sun exposures were not always accurate indicators of pigment performance indoors, he constructed an exposure apparatus using high intensity daylight fluorescent lamps as a light source. His paint specimens were exposed to the sun in two locations, as well as to the fluorescent illumination.

In 1976 he published the results of these tests in the book "Artists' Pigments: Lightfastness Tests and Ratings" and furnished copies to anyone who was interested. He also drafted a revision to CS98-62, incorporating the results of these tests, and submitted it to the Bureau of Standards as Proposed Standard TS2905. However, at this time the Bureau of Standards was halting work on voluntary commercial standards so development of the standard was taken to the American Society for Testing and Materials (ASTM). Meantime new information led Henry to believe that he should have exposed his paint specimens longer, so in 1979 he began all over again. This time with the cooperation of art material companies, a larger group of 92 pigments were included and identical specimens of each were exposed in a Xenon arc apparatus, in addition to two sun exposures and exposure in the fluorescent apparatus.

In addition to formulating the paints, making the specimens, and paying for the materials and exposure, he worked on 6 other test methods addressing questions about art materials that he and others believed are important. His work led directly to two ASTM standards, D 4302 and D 4303, and is fundamental to another still under development. His work on the comparative yellowing of oils, varnishes and resins during dark storage and their subsequent recovery in daylight, was published in the journal *Color Research and Application*. He was a joint author with F. Sutil and E.T. Vonderbrink on another paper published in the same journal, "Lightfastness of Pigmented Handmade Paper".

Henry was a practical idealist and optimist. He was patient with anyone who wanted to learn about art materials. It was an honor to know Henry and I don't believe the art material industry, or the individual artist, yet understands how much we owe him.

Joy Turner Luke

CALENDAR

Please send information on Member Body and other organization meetings involving color with dates, places and information source to:

Harry K. Hammond III
Pacific Scientific Instrument Division
2431 Linden Lane
Silver Spring, MD 20910
(301) 495-7046

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ASTM COMMITTEE D-20 ON PLASTICS, July 11-14
Town and Country Hotel, San Diego, California, Information:
Robert Morgan, (215) 299-5505.

**ILLUMINATING ENGINEERING SOCIETY
OF NORTH AMERICA, August 7-11**
Annual Conference, Minneapolis Marriot Hotel, Minneapolis,
Minnesota. Information: Diane Darrow, (212) 705-7269.

AIC MID-TERM MEETING, Aug. 8-11
Color in Environmental Design, Winterthur Polytechnic;
Winterthur, Switzerland. Information: Prof. Werner Spillman, Dept. of
Architecture, 8401 Winterthur, Switzerland.

**AMERICAN PSYCHOLOGICAL ASSOCIATION,
96TH ANNUAL CONVENTION, Aug. 12-16**
Atlanta, Georgia. Information: (202) 955-7705.

**AMERICAN SOCIETY OF PHOTOGRAMMETRY
& REMOTE SENSING, Sept. 12-16**
Fall Convention, Convention Center, Virginia Beach, Virginia.
Information: Mary Buit, (703) 534-6617.

DETROIT COLOR COUNCIL, Sept. 22
Current Color Problems and Needs for Solutions, Ralph Stanzola.
Raddison Hotel, Southfield, Michigan. Information: Jim Keiser,
(313) 583-8345.

AATCC 88 INT'L CONF. & EXHIBIT, SEPT. 38-OCT. 1
Opryland Hotel, Nashville, Tennessee. Information: Jerry Tew, (919)
549-8141.

SOCIETY FOR INFORMATION DISPLAY, OCT. 4-6
International Display Research Conference (IDRC), Hyatt Islandia
Hotel, San Diego, California. Information: (213) 305-1502 or (212)
620-3388.

ASTM COMMITTEE D-20 ON PLASTICS, Oct. 10-14
Toronto, Canada. Information: Robert Morgan, (215) 299-5505.

**FEDERATION OF SOCIETIES FOR
COATINGS TECHNOLOGY, Oct. 19-21**
66th Annual Meeting and 53rd Paint Industries' Show, McCormick
Place, Chicago, Illinois. Information: (215) 545-1507.

U.S. NATIONAL COMMITTEE, CIE, Oct. 23-25
Hawthorne Inn, Salem, Massachusetts. Information:
Jack Hsia, Sec'y USNC, (301) 975-2342.

AATCC COLOR MEASUREMENT WORKSHOP, Oct. 25-26
AATCC Technical Center, Research Triangle Park, North Carolina.
Information: Jerry Tew, (919) 549-8141.

**OPTICAL SOCIETY OF AMERICA, ANNUAL MEETING,
Oct. 31-Nov. 4**
Santa Clara Convention Center, Santa Clara, California. Information:
(202) 223-0920.

DETROIT COLOUR COUNCIL, Nov. 3
Visual Shading and Instrumental Color Matching, Allan Rodrigues.
Northfield Hilton, Troy, Michigan. Information: Jim Keiser,
(313) 583-8345.

AATC NAT'L TECH COMMITTEE MEETINGS, Feb. 14-16
The Doral Inn, New York, New York. Information, Jerry Tew, (919)
549-8141.

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AATCC RESEARCH COMMITTEE MEETINGS, Feb. 14-16
Hilton at University Place, Charlotte, North Carolina. Information:
Jerry Tew, (919) 549-8141.

AIC COLOR 89, Mar. 13-17
Centro Cultural, General San Martin, Sarmiento 1551, Buenos Aires,
Argentina. Information: Grupo Argentino del Color, Division Optica,
INTI, c.c. 157, 1650 San Martin (BA), Argentina.

AATCC RESEARCH COMMITTEE MEETINGS, May 9-11
AATCC Technical Center, Research Triangle Park, North Carolina.
Information: Jerry Tew, (919) 549-8141.

**COUNCIL FOR OPTICAL RADIATION MEASUREMENTS
(CORM), ANNUAL MEETING, May 17-19**
National Bureau of Standards, Gaithersburg, Maryland. Information:
Norbert Johnson, CORM Sec'y, (612) 733-5939.

OPTICS 89: OSA ANNUAL MEETING, Oct. 15-20
Orlando, Florida. Information: OSA, 1816 Jefferson Place, N.W.,
Washington, D.C. 20036, (202) 223-0920.

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