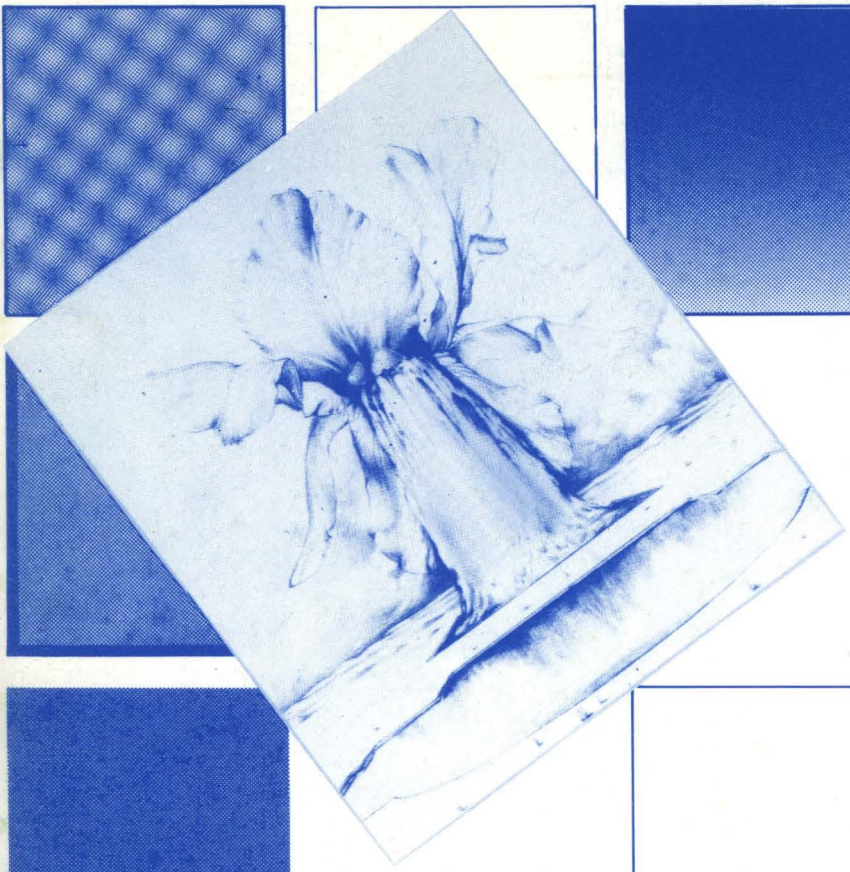

AIC

abstracts

mondial couleur

85

M O N D I A L C O U L E U R 8 5

16 - 22 juin

MONTE-CARLO

Recueil des résumés des communications orales et des posters.

Abstracts book of oral and poster communications.

Ces résumés sont classés par ordre chronologique journalier, salle par salle.

Nous regrettons que de nombreux conférenciers n'aient pas tenu compte des instructions de présentation, ce qui rend ce document disparate et parfois difficilement lisible.

Nous avons dû abandonner la publication des résumés courts dans les 3 langues, la plupart des traductions étant incohérentes.

Abstracts are sorted out by chronological order, room by room.

We are sorry that many lecturers have not taken into consideration our practical instructions so that this document looks dissimilar and sometimes uneasy to read.

We have been obliged to renounce the publishing of the short abstracts in 3 languages, most of translations being incoherent.

LUNDI 27 JUIN
MONDAY, JUNE I7
matin et après-midi
morning and afternoon

COMMUNICATIONS ORALES
ORAL COMMUNICATIONS

AUDITORIUM
SALLE B
SALLE C
ROOM B
ROOM C

UNDERSTANDING COLOR VISION THROUGH COLORIMETRY

By O. ESTEVEZ

Lab. of Medical Physics, University of Amsterdam.

The colorimetric specification of an object's color requires, on the one hand, knowledge of some of its physical properties and on the other hand, a Colorimetric system that correctly represents an appropriate observer under the conditions that the object is supposed to be viewed.

The simplest color specification is that of Basic Colorimetry where one asks only whether, for a given observer, two colors will or will not match if seen side by side in an otherwise neutral environment. If the spectral distribution of the light emitted or reflected by the object is known, this question can be readily answered by a computation that makes use of the Color Matching Functions ('CMF') of this observer.

Because the CMF are but a transformation of the sensitivity functions of the photoreceptors subserving the match, a wealth of information about the observer's color vision can be extracted from these functions, even by simple inspection, if only one bears in mind the rules that govern the transformation from receptor sensitivities to CMF. These rules are best understood by examining first the (physiological) color space determined by the photoreceptors and then its projection to the (physical) color space in terms of a chosen set of primary colors.

An important result of this exercise contributes to a deeper understanding of the basic unity amongst the different forms of human color vision, namely dichromatic, normal and anomalous trichromatic. This unity can be expressed succinctly in one theorem:

> 'For any given color in any chosen chromaticity coordinate basis, the loci of the color matches of a normal trichromat and an anomalous trichromat are colinear with the confusion locus of a corresponding dichromat'.

Using this principle, it can be shown that the matching variability that is found to occur between different observers is not totally random, but that it reflects in an orderly fashion the differences between their photoreceptor sensitivities. By this analysis it is also possible to identify the 'odd' receptors and the way in which they differ.

The theorem can also by applied to understand the variability and the diversity of the color matching behaviour that a particular subject can display under different viewing conditions; specific examples are: normal variability in repeated matches, differences between 'maximum saturation' vs 'Maxwell' matching and 'high' vs 'low' intensity matches.

20 Jahre Anwendung des spektralen Bewertungsprinzips in der Pigmentprüfung

Dr. Hans G. Völz Krefeld, BRD

Das spektrale Bewertungsprinzip,eine Rückkopplung zwischen KUBELKA-MUNK-Theorie und Farbmetrik,wurde geschaffen für die Bestimmung des Deckvermögens von bunten Anstrichen,ist aber ganz allgemein überall dort anwendbar,wo Testmethoden auf der Beurteilung eines Angleichs von Farbabzügen beruhen.Seit dem Verfahren der ersten Stunde wurden zahlreiche Verbesserungen angebracht,z.B. die Einführung eines vorgegebenen CIELAB-Farbabstandes als Deckvermögenskriterium,ein besseres Iterationsverfahren,eine genauere Bestimmung der Streu- und Absorptionskonstanten sowie der Schichtdickenmessung und die Aufspaltung des Deckvermögenswertes in einen Streu- und Absorptionsanteil.Bei bunten Anstrichen ergeben sich Vereinfachungen,die die Benutzung von Rechenhilfen gestatten.Das spektrale Bewertungsprinzip konnte auch auf andere Prüfmethoden angewendet werden,nämlich auf die Farbstärke und die Transparenz.

Simplified Approach to Many-Flux Calculations For Predicting Reflectance of Paint Film

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Department of Physics,
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ABSTRACT

The reflectance of paint film can be predicted from scattering and absorption characteristics of pigments using K-M equations. K-M theory has several limitations. To overcome these limitations, the number of fluxes inside the paint film in mathematical model proposed by B-A-B was increased to four. The recent theoretical advancement in the subject is made by Mudgett and Richards by introduction of many-flux theory. This theory eliminates all the limitations of K-M theory. The application of this theory is highly complicated as it requires to plug in Mie theory parameters like scattering and absorption coefficients, and phase function.

Allen has proposed to use H-G equation to simulate Mie theory phase function. We have developed simplified equation to estimate the parameter of H-G phase function. Series of equation to estimate the Mie theory scattering and absorption coefficients in various range of particle size and refractive index of interest to colour science are given. The utility of these simplified equations have been established by computing the reflectance of paint film, for selected particle sizes upto a range of $X = 5 \left(= \frac{2\pi r}{\lambda}\right)$ and refractive indices $m = n - ik$, n varies from 1.10 to 2.00 and $k = 0.001$ to 0.10. The results are compared with those obtained by using rigorous Mie theory equations. The reflectance predicted by both sets of equations agree well.

Inprovement of Kubelka-Munk Function by Selected Specular Reflection

Yukio Murata

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Kubelka-Munk Function is sometimes can't be applied to deeper shades accurately in textile dyeing. To improve this problem,adding correction refer to Selected Surface Specular Reflection (bronze) on the measured reflectance R' is supposed most suitable.

Kubelka-Munk function is widely used for CCM,however the accuracy of predicting can't be satisfied for range of high dye concentration (R' is below 2-5%). Many reports to improve linear correlation between dye concentrations and K/S values had been published, such as Pineo,Aspland,Fink-Jensen and L-O-G etc.. These improvements were only based on introducing of internal or external Fresnel's reflections. However the effect has't been satisfied until today. In this paper I intend to improve the correlation by introducing Selected Specular Reflection (SSR). For this purpose following formula is proposed.

$$R=R'-f2[(n-1)^2+n(f1\cdot K/S)^2]/[(n+1)^2+n(f1\cdot K/S)^2]$$

Where R' and R are measured and real reflectance, f1 and f2 are appropriate coefficients,K/S is real Kubelka-Munk value which supposed to calculated by by R,and n is refractive index of boundary. By appling R in Kubelka-Munk function,better linear correlation was found out even at high dye concentration range.

INSTRUMENTAL MATCH PREDICTION WITH POLYESTER-COTTON BLEND

CHONG T.F. HONG-KONG

Instrumental Match Prediction with Polyester-Cotton Blend

Instrumental match prediction with single component fibre has been proven to be successful as far as non-fluorescent colorants is concerned. Development of the fibre blends in the textile market has been significant due to the advantages of its unique physical properties such as higher strength, better anti-crease properties and lighter in weigth etc.. However, match prediction with fibre-blends has been met with some difficulties. This paper will discuss the difficulties associated with fibre-blends match prediction supported by experimental examples. The characteristics of the present methods designed to minimise these problems are studied and tested for accuracy. A proposed method has found improved accuracy.

Vereinfachte Farbrezepturberechnung für fluoreszierende Farbmuster (Tagesleuchtfarben)

Günter Döring Berlin

Wegen ihrer ausgeprägten Signalwirkung werden Tagesleuchtfarben nicht nur in der Werbung, sondern auch z.B. beim Anstrich von Feuerwehrfahrzeugen und von Seezeichen für die Schiffahrt in zunehmendem Maße eingesetzt. Mit dem steigenden Einsatz von Tagesleuchtfarben wächst auch die Erfordernis eines einfach zu handhabenden Verfahrens, mit dem Tagesleuchtfarben zuverlässig rezeptiert werden können.

Die Farbrezepturberechnung für fluoreszierende Farbmuster ist erheblich schwieriger als für nichtfluoreszierende Aufsichtfarbmuster, da bei den spektralen Strahldichtefaktoren auch der Beitrag der Fluoreszenz berücksichtigt werden muß. Es wird ein einfaches Verfahren beschrieben, mit dem fluoreszierende Lackfarbmuster in einem kleinen Bereich um eine Ausgangsfarbe rezeptiert werden können. Das Verfahren arbeitet mit einer Korrekturmatrix und rezeptiert auf Gleichheit der Farbmaßzahlen x,y,Y und nicht auf Gleichheit der Strahldichtefaktoren. Die berechneten Rezepturen bestehen aus vier Komponenten, die fluoreszierende oder nichtfluoreszierende Lackfarben sein können. Am Beispiel von vier grünen Tagesleuchtfarbmustern wird die Arbeitsweise des Rezeptierverfahrens beschrieben.

THE APPEARANCE OF CONCENTRATED COLLOIDAL DISPERSIONS

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BEDFORD. UK.

The appearance of concentrated colloidal dispersions can be described in terms of two characteristic parameters; the absorption coefficient K, and scattering coefficient S. These may be calculated from reflectance data obtained on thin layers of sample using Kubelka-Munk (KM) theory.

Experimental systems (liquid paraffin-in-water emulsions) were chosen with very low absorbance (between 400-700 nm). KM absorption coefficents were at least two orders of magnitude less than than equivalent scattering coefficients. Samples were prepared with a range of well-chacterised particle size distributions, dispersed phase volumes, and refractive index ratios.

Using an extension of Mie scattering theory these structural parameters were used to calculate expected KM scattering coefficients. These were in good agreement with those obtained experimentally. Samples were also assessed by a trained appearance panel, using a magnitude estimation technique. Excellent correlation was obtained between mean perceived opacity scores and measured KM scattering coefficients.

The relationship between microstructure of the dispersion and perceived appearance has been clearly demonstrated in these systems. Further work will consider absorbance effects in addition to scattering.

The Reflectance of Metallic Paints

Dr T. Bridgeman, Dept. of Applied Mathematics and Theoretical Physics, The University, Liverpool L69 3BX, ENGLAND.

The isotropic and directional scattering in a metallic paint is approximated by a particular phase function. The general theory of radiative transfer is then used to find both exact and approximate expressions for the reflectance.

The solutions are compared in order to establish which approximate solution is most accurate and which is most suitable for practical application to colour matching procedures.

A NEW PROCEDURE FOR ACQUIRING COLOR MIXTURE DATA AT THE BLUE END OF THE SPECTRUM

Glenn A. Fry, Ph.D.

Columbus, Ohio, U.S.A.

Wright located the colors at the blue end of the spectrum on a mixture diagram by desaturating them with 530 mn and matching them to mixtures of 460 nm and 650 nm. Guild used filtered stimuli near 460, 542 and 630 nm and used white instead of green to desaturate the test stimuli. The difficulty is that of making certain that the center of the MacAdam ellipse of the blue-red mixture coincides with the desaturated violet stimulus. I have solved this problem by using 536 and 417 nm as primaries and by matching mixtures of these two primaries to the intermediate monochromatic stimuli desaturated with 680 nm. The MacAdam ellipses are elongated in the direction of the 536-417 line. The mixture of the test stimulus and 680 nm required for a match can be easily determined. But the mixtures of 536 and 417 nm required for the match can range all the way from one end of the MacAdam ellipse to the other. The solution to the problem is to locate the limits of the ellipse and assume that the center falls midway between the limits. I have used stimuli assessed in luminance units and the resulting mixture diagram is a constant luminance diagram. The colors at the blue end of the spectrum fall on a line which passes through 680 nm which may be used to locate the blue fundamental.

The Second Report on Principal Hue Components in Object Colors

Tarow Indow, University of California
Irvine, USA

The first report was presented in Color 77. The subject i assessed principal hue components α inherent in a given color j or k (j,k=1,2,...,n), e.g., redness and yellowness in a color of YR. Denote the data by a matrix $\{\xi_{(i\alpha)j}\}$. A computer program was developed to construct in an m-dimensional space a configuration of points representing colors, $\{P_j\}$, and unit radial vectors representing hue α perceived by i, $\{f_{(i\alpha)}\}$, on the basis of either $\{\xi_{(i\alpha)j}\}$ alone or a matrix of scaled color differences $\{d_{jk}\}$ also. $\{P_j\}$ is assumed to be the same for all, but f_α may have individual differences. Relations between $x_{(i\alpha)j}$, coordinates of P_j on $f_{(i\alpha)}$ and, if used, the relation of d_{jk} to interpoint distances $\hat{d}_{jk}$ are specified to be power-functions. Colors used are 104 Munsell colors, 47 and 49 OSA Uniform Color Scale samples of V5 and V6 subplanes, etc. Coordinate $x_{(i\alpha)j}$ can be either covariant or contravariant component of P_j, and interpoint distances $\hat{d}_{jk}$ are given either in terms of Euclidean or Minkowski's power metric. This is an extension of the article in Color, Res. and App., 1980, 5, 5 - 12.

Tristimulus Condition for Non-chromatic Sensation

Munehira Akita
Yoshimichi Ejima
and
Shigeko Takahashi

Kyoto Japan

Mixing ratios of a red,green, and blue light at the various intensity levels were determined on the basis of the non-chromatic sensation,i.e.,the neither reddish nor greenish and neither yellowish nor blueish appearance of color. When a level of intensity of the lights was raised, a G/R ratio remained constant while B/R ratio decreased. The result was discussed within the framework of the R-G and Y-B color opponent processes, and a nonlinear model of the color visual system was proposed.

Field Trials of a Nonlinear Model for Color Appearance under Various Conditions of Chromatic Adaptation

Y. Nayatani*, K. Takahama**, H. Sobagaki**, and K. Hashimoto***

* Osaka Electro-Communication University, JAPAN
** Electrotechnical Laboratory, Osaka Branch, JAPAN
*** Matsushita Electric Ind. Co, JAPAN

A nonlinear model was already reported(1983), which directly predicted the color appearance of object colors under adapting illuminations with various colors and illuminance levels. It was developed from the nonlinear model for chromatic adaptation(1981,1982,1984) on the basis of the model for predicting color appearance proposed by Hunt(1982). The present nonlinear model for color appearance could predict the constant-hue lines of object colors, the Helson-Judd effect, the Hunt effect, and the Stevens effect.

The purpose of the present study is further to make a field trial of the model under adapting conditions with various illuminant colors and illuminance levels. A comparison is made between the visual assessment and the corresponding prediction by the model in the following three experimental conditions.

(1) Subjective estimates by Fuchida and Mori(1982) for 8 moderately saturated colors under various artificial light sources, especially chromatic and plant-growth fluorescent lamps.
(2) Assessment of change in colorfullness of chromatic samples only by changing the illuminance of a white light source.
(3) Subjective hue estimates of a series of nonselective samples under high saturated illuminations, especially yellow illumination (the Helson-Judd effect).

It is found that the model is effective in predicting all the above experiments, the present study also confirms the appropriateness of the methods of determination of hue perception and the coefficient e_s used in the Hunt model. In addition, a method of transformation is given for comparing a subjective estimate and the corresponding prediction by the model. It is confirmed that the model will be effective in a future study of color appearance and color rendering.

INFLUENCE OF LUMINANCE ON SURFACE COLOUR SATURATION

María L. F. de Mattiello, Buenos Aires, Argentina

The effect of illuminance and reflectance on saturation is analyzed in four different hues: blue 460 nm, green 510 nm, yellow 580 nm and red 620 nm with illuminance and reflectance ranges of 2.4-3400 lux and 12-65 %, respectively. The obtained data demonstrated once again (a) that an increase in saturation is the result of power functions; (b) that function families that intercept each other at points where colorimetric purity and saturation remain invariant with reflectance, are observed in a single hue; and (c) that a perceptive scale can be used for this variable.

It is shown that reflection modifies the increase in saturation due to the changes it produces in the appearance of colour. Illuminance, in turn, would help to increase the colourfulness of surfaces.

From the analysis of these results it is concluded that conspicuous saturation functions display exponents close on 1.4; 2.4; 3.4 and 1.7 for blue, green, yellow and red, respectively.

Measurement of Perceived Brightness for Isolated Lights

V A BARBUR - Kodak Limited, Research Laboratories, Harrow, England

Brightness is often described as representing the perceptual correlate of luminance, and therefore an estimate of brightness is usually based on the luminance of the stimulus. The luminance is computed by weighting the spectral power distribution of a given source or surface by the CIE spectral luminous efficiency function of the eye, i.e., V_λ. However, previous studies have shown that the use of CIE V_λ function in this way underestimates the brightness of short wavelength lights (Judd, 1951) and that under certain conditions of viewing, lights which appear equally bright are not necessarily of equal luminance (Wagner and Boynton, 1972; Kaiser and Comerford, 1975).

This paper deals with the perceived brightness of monochromatic lights when viewed against a dark background. The test stimuli consist of twenty pure monochromatic circular targets covering the visible range of the spectrum and subtending some 2^0 at the observer's eye. Psychometric response functions were obtained for each test wavelength using a modified delayed matching technique whilst adaptation was maintained to a constant white (4000 K) throughout.

Spectral sensitivity functions derived from these brightness discrimination data will be presented for a variety of conditions, e.g., brightness discrimination with respect to a red, green, blue, yellow and white reference target. These results show little or no variation with the colour of the reference target and are significantly different from the CIE spectral luminous efficiency function. Psychophysical brightness discrimination data for selected stimuli will be related to predictions of luminance computed by means of both the CIE V_λ function and the spectral response data obtained from our experiments.

1. KAISER, P.K. and Comerford, J.P. (1975), Vision Res, 15, 1399-1402.
2. JUDD, D.B. (1951), C.I.E. Proceedings, Stockholm, p.11.
3. WAGNER, G and Boynton, R.M. (1972), J. Opt. Soc. Amer. 62, 1508-1515.

COULEUR ET PUBLICITE : INTERACTION COULEUR X FORME DANS LES JUGEMENTS CONNOTATIFS EN FONCTION DU NIVEAU CULTUREL.

D. HAUTEKEETE, A. GUILBERT, S. DECOUT, X. VAXEVANOGLOU,
M. HAUTEKEETE.
LABACOLIL III, UNIVERSITE LILLE III. FRANCE.

Cet ensemble de recherches porte sur l'influence de la couleur dans les jugements connotatifs portés sur 1 produit manufacturé (automobile) selon ses caractéristiques physico-sociales (petite voiture, grosse voiture). L'étude porte sur 3 populations (60 étudiants, 60 ouvriers et 60 cadres) potentiellement différentes quant à leurs connotations vis à vis de la couleur des voitures. Ces connotations sont mesurées expérimentalement par le différenciateur sémantique d'Osgood. Nous employons 12 échelles bipolaires en 7 points, 3échelles couvrant le champ sémantique multidimensionnel.(activité, puissance, valeur), les 9 autres étant choisies pour l'importance qu'elles révèlent dans les connotations vis à vis de la couleur. MÉTHODE :Les sti muli sont des diapositives montrant des automobiles "grosses" ou "petites" variant selon 12 couleurs pures (vives) ou rembrunies (sombres) suivant la méthode de Hickethier. RESULTATS : Ilapparait une importante homogénéité des 3 populations pour ce qui concerne la couleur. Celle-ci produit des effets statistiquement significatifs sur les 12 échelles en nombre sensiblement équivalent dans les 3 groupes. La variable "taille des voitures" donne des résultats allant dans le même sens, bien que moins marqués. Notons que si pour les étudiants et les cadres la couleur entre en interaction avec la forme, aucune interaction n'apparait chez les ouv riers. L'unanimité est réalisée sur 8 échelles pour la couleur et sur 4échelles pour la forme. L'impact de la couleur est plus fréquent que celui de la forme dans les différentes dimensions du jugement psychologique chez les ouvriers et las cadres alors que les étudiants dénotent une égalité des effets des 2 variables. Nos résultats impliquent la necessité de tenir compte du type de population dans la publicité sur les automobiles en interrelation avec les cognitions vis à vis de la couleur de celles-ci.

STYLING POLICY IN THE U.S. AUTOMOTIVE MARKET

Len Dick, Color and Style Manager PPG CLEVELAND

An insight to a unique approach to color styling presentations to the U.S. Domestic and Foreign/Domestic automotive market. Many months of research and development by multiple groups precedes the annual color show presentation.

A staff of aesthetic fine arts graduate designers determine the future color trends.

The design staff corroborates and cross-checks the projected future color trends. A 12 to 14 color palette is developed, representing PPG's concept of the new color directions for the U.S. automotive market.

A multi-unit technical support staff develops new color effects in four or five unit families of color around the project.

The completed new color show is presented to the color styling groups of the Domestic and Foreign/domestic automotive manufacturers.

All of this new color research and development allows the automotive color stylists to create new interior colors around which they can generate a series of exterior colors suitable for the various models, pursuant to the dimensions, shapes and consumer they are appealing to in the future car line-up.

COLOUR AND MOTOR-CAR

KLEEMANS CH. NEL

The use of colours on automobiles shows a development in the course of years. These changes will be described and an extrapolation will be given till approximately 1990. The automobile is understood as a characteristic element of the cultural pattern of the Western countries. The conception of the motor-car as a fourth skin is relevant for a discussion on custom-painting and colour-design. The influence of fashion can be clearly demonstrated. Automotive colours often are determining factors in the aspect of streets. The function of colour-designer is a recent specialism that will be of growing importance. Education in this field is highly desirable. Finally the visibility of the motor-car in the traffic will be treated, as well as the influence, in a positive or a negative sense, of the colour-design on the visibility.

POUR UN MARKETING COULEUR DANS LA PRODUCTION INDUSTRIELLE

Jean Philippe Lenclos

POUR UN MARKETING COULEUR DANS LA PRODUCTION INDUSTRIELLE

La sensibilisation du public aux phénomènes de la couleur oblige de plus en plus les industriels à concevoir des gammes de couleurs adaptées aux tendances du marché.
Le prêt-à-porter, mais aussi le bâtiment, l'électro-ménager, l'informatique, l'automobile, sont concernés par cette nouvelle demande qui doit dorénavant s'inscrire dans la stratégie marketing de toutes les entreprises concernées par les biens de consommation.
Si la couleur est un outil de séduction indispensable à la promotion qualitative d'un produit, elle n'en est pas moins régie par des lois précises et intervient de façon quantifiable dans la segmentation des clivages socio-culturels.
Ainsi, l'environnement et les styles de vie influencent les choix de couleurs des consommateurs qui, selon l'âge, le sexe, la catégorie sociale, le lieu géographique, utilisent des vocabulaires de couleurs très différents.
Si l'industriel a une idée précise des typologies de clientèles sur son marché, le coloriste peut identifier des tendances de couleurs étroitement correlées aux besoins d'un segment de marché.
La mission du coloriste ne se limite donc pas simplement à créer de "belles couleurs", elle participe activement au processus de création industriel en concevant et en gérant des gammes de couleur qui contribuent à rationnaliser la production, à faciliter la tâche des bureaux d'études et favorisent le succès commercial de l'entreprise.

Title - TEXTILE DESIGNS BY COLOUR GRAPHICS COMPUTER

Name of the Author - Dr.(Mrs.)Shalini Patwardhan, India.

Weave, compounds of form and blending of colours are the three primary elements of textile design. Weave relates specifically to the build or structure of the fabric. Combination of form is the surface decoration obtained by amalgamating, linear and correlinear lines and ornament, consisting of geometrical or floral features, to various end products such as dress, mantle, vesting fabrics, tapestries, carpets etc. Colouring and the combination of colours impart brightness of tone and improve the qualities of the design in woven, knitted and printed textile products.

With the introduction of new fibres and new dyes, advances in machinery, flow of export trade, new applications of textiles, change in aesthetic sense and designing style with country and culture - designing for textiles has become an everyday challenging job to the textile designer. The latest high resolution colour graphics computers provides full freedom to the user for selecting colours, changing colour schemes and structures of the fabric through Computer hardware and software. The user is allowed to play with colours of the designs, which are obtained on the VDU by programmes or by graphic tablet; and is free to select his own designs and retain the colour hard copy of his selection for further reproduction in process.

Color Properties of Polymer Liquid Crystals and Their Application to Arts
(to be presented in English)

David Makow
National Research Council of Canada
Ottawa, Ontario

Liquid crystals of the cholesteric type can be used in painting and sculpture and produce color effects not possible with pigments and dyes (ref. 1,2). The effects are produced by interference of light from the molecular layers of the material and result in additive color properties, high saturation and expanded color gamut, change of color with angle of viewing and with some materials with ambient temperature. Polymer liquid crystals of the polysiloxane type produce durable and stable coatings and effects that are more pronounced than with other liquid crystals. Experimental work was carried out confirming the above effects. Also it has been shown that the spectral reflectance of colored substrates can be modified by coating them with LC materials having a reflectance peak at the desired band of wavelength. Examples of paintings and sculptures using these materials will be shown and the effects, which permit new form of expression for the artist, will be discussed.

1. David Makow. Color Properties of Liquid Crystals and Their Application to Visual Arts. Color Research and Application, Vol. 4, No. pp. 25-32 Spring 1979.

2. David Makow. Liquid Crystals in Painting and Sculpture. Leonardo Vol. 15, No. 1 pp. 257-261, 1982.

FRANCE

Présentation d'un film video de 8 minutes.

"NAGER DANS LE MOULIN OU NAGER DANS LE FLEUVE."
PEINTURES DE INGEBORG KRESSER.

Le film donne une impression des travaux de Ingeborg Kresser en integrant le "procédé" de peinture: fusion des couleurs sur le tissu, application et collage de differents éléments - bois peint, tissu teint - recherche d'un équilibre des couleurs. Le sujet principal réside dans la technique de cette peinture, qui par l'utilisation de materiaux inhabituels montre une autre dimension de la peinture sur tissu.

LUNDI I7 JUIN
MONDAY, JUNE I7

COMMUNICATIONS AFFICHEES
POSTER COMMUNICATIONS

SALLE DES POSTERS
POSTER ROOM

SESSION I

An equipment to measure wavelength discrimination

Françoise VIÉNOT, Franck BOUHARD and Marc SCHOEFFTER

PARIS, FRANCE

An equipment is presented to measure the wavelength discrimination curve. It is built of simple optical components, and presently hand-operated. Wavelength setting and difference of wavelength adjustment are performed continuously; an independent balance of luminance is provided.

The equipment gains interest from its compactness and the unrestrained mode of viewing. Tests of the equipment with normal observers and one deuteranope observer have been performed successfully. Special procedures can provide a reliable test of color defects.

EQUIVALENT LUMINANCES OF COLOUR SURFACES AT EQUAL SATURATION

María L. F. de Mattiello, Buenos Aires, Argentina.

Experience has shown that surface colour luminance is not related in a simple manner to its photometric luminance, and various studies have therefore been conducted to describe the influence of saturation on this variable. Proceeding with this research line, this study analyzes the luminance of nine different hues using the magnitude estimation and intramodal matching techniques. From the obtained data luminance and saturation isocontours can be drawn at constant chrome and reflenctance levels that help to describe the behaviour of chromatic sensations.

The luminance isocontours show that an increase in reflectance must take place in the intermediate zone of the spectrum if equal estimated luminance levels are to be obtained, while an invariable zone is observed between 500 and 550 nm. These differences tend to disappear at low reflectance levels. Equal chromaticity contours, in turn, display a shape similar to that of saturation thresholds at high chroma levels while those differences tend to disappear at low reflectances and particularly at low chroma levels.

From the number of measurements that have been made and the correspondence between the obtained reflectance and chroma levels it is possible to draw spatial surfaces that represent equivalent chromatic sensations. These surfaces, which display a double curvature, show once again how difficult it is to specify chromatic sensations based on simple equations.

Title: LIGHTING AND COLOUR IN TELEVISION

Author: A N CHALMERS, UNIVERSITY OF NATAL, DURBAN, RSA

ABSTRACT

New types of high-efficacy gas-discharge lamps are being used increasingly to illuminate areas where colour TV outside-broadcasts may be made. The high efficacy, the good optical control, and the long life of these lamps result in lighting-systems that produce more light, less heat, and a lower overall cost per lumen-hour than corresponding incandescent-lamp systems. Questions remain, however, regarding the effects that these light sources have on the colour TV picture quality.

This contribution thus describes a parallel pair of investigations (one subjective and the other purely physical) of the performance of these gas-discharge sources as illuminants for colour TV. In both cases, the basis of the investigation was a comparison between the colour reproductions obtained under a reference source and under each of the gas-discharge test sources in turn.

Since tungsten-halogen lamps are used almost universally for TV studio lighting, and most camera systems are accordingly optimized for use with these sources, the tungsten-halogen lamp was a logical choice for the reference source in this work. Seven different varieties of High-Intensity Discharge lamps were studied as test sources, along with four different types of fluorescent tubes.

Provided the illuminance levels were sufficiently high, reproduced pictures of acceptable colour quality were obtainable with the great majority of the lamps investigated.

Lichtverlust und Farbveränderung im Wohnraum

Mag. Edda Mally, Wien, Vienna-Austria

Da die Helligkeit im Raum ganz wesentlich den Eindruck und die damit verbundene Wirkung der Farbe beeinflußt, wurde ein Meßprogramm erstellt und durchgeführt.
Im Verlaufe dieser Untersuchungen wurden die Lichtverhältnisse von 2 verschiedenen Meßräumen (Decke, Wände, Boden) bei Schön- und Schlechtwetter im Tagesverlauf über ein ganzes Jahr gemessen und aufgezeichnet. Für den "dunkelsten" Monat, Dezember, und den "hellsten" Monat, Juni, wurden alle Meßdaten in Diagrammen dargestellt und die Meßergebnisse (bei Sonne) von Boden und rechter Seitenwand auch rechnerisch ausgewertet. Dabei wurde festgestellt, daß nur wenige Prozente des Sonnenlichtes Wand und Boden im Wohnraum erreichen. Ferner wurde deutliche, wie sehr sich die Lage der Räume, deren Ausstattung und Farben auf den Helligkeitseindruck auswirken.

COLORIMETRIC APPLICATIONS OF A SIMULATION SOFTWARE

Gregorio FEIGUSCH, Girolamo GUIDA, Mariano MEROLA - ROMA -

The use of personal computers has brilliantly solved the problem of extensive colorimetric calculations based on spectroradiometric or spectrophotometric data. Nevertheless a specific colorimetric software may prove not very useful in the analysis and in the design of complex optical sistems. The Authors had to face this problem in the analysis of the colorimetric features of a new colour-light signal adopted by the Italian Railways.

In this signal, dichroic filters play different roles in bringing about the different coloured lights-red, yellow and green - thus giving rise to an interdipendence among their cromatic features.

The automatic recalculation facility offered by a simulation software - actually planned for quite different applications such as sales projections, cost estimates, financial ratios, etc. - gives the opportunity of avoiding new calculations connected to each variation in the filter characteristics. Such a different approach to colorimetric calculations offers a further advantage in that there is no need to know programming techniques: every experimenter can easily create the "electronic worksheet" which solves his problems.

The Authors explain the use of this simulation software both in the analysis of the described problem, and in the most common colorimetric applications.

COLOURIMETRY INVESTIGATION AT TEMPERA PAINTS

T.Kehlibarov, K.Krastev Sofia

Is continuous illumination of icons, paintings and other works of art in museums and art galeries safe ?

In order to answer this question we set up an experiment with a number of tempera paints illuminated with light sources for different time intervals.

The changes in the colour of these paints were studied by means of the spectrophotometric reflection curves and the CIELAB colour difference formulae.

The trends in the change of the perceived colours are shown as well as the necessity of long - term studies of the harmful effects due to the continuous illumination of works of art with high intensity light sources.

MOUVEMENTS OCULAIRES ET INTEGRATION CHROMATIQUE D'UNE TOILE
(Confrontation d'une analyse colorimétrique et électro-oculographique)

GUELTON Bernard 39 rue du connétable 60500 CHANTILLY

La description des propriétés chromatiques perceptives d'une toile constitue une première approche.
La "mise en acte" effective de ces propriétés chromatiques par des sujets réels en constitue une deuxième.
Qu'advient-il si ces deux démarches sont confrontées ?
Les premiers résultats concernent les corrélations significatives entre les liaisons accomplies par les sujets d'une part, et les liaisons révélées par l'analyse colorimétrique d'autre part.
Par ailleurs, il semble se marquer une différence significative entre sujets-peintres et sujets non-peintres lorsque l'on dissocie ces deux groupes. Ces résultats permettent plusieurs hypotheses. I) L'exploration des sujets-peintres rend mieux compte de l'intégration chromatique de la toile que celle des sujets non-peintres. Il y aurait ainsi une stratégie oculomotrice propre à la"vision esthétique" . 2) L'intégration chromatique de la toile se définit dans l'analyse colorimétrique par le degré d'interaction des couleurs. Ces interactions sont exprimées par des points sur le graphique de l'analyse colorimétrique. Certains de ces points ou alignements de points sont confondus et caractérisent ainsi l'intégration. Ces points d'interaction sont les simulations de ce que seraient les mélanges des couleurs.
Il semblerait donc que les parcours accomplis par les sujets soient en correspondance avec des points d'interaction qui simulent des mélanges de couleurs. Certains de ces points étant confondus, ils simulent des mélanges qui seraient confondus si l'on venait à les réaliser àl'aide de disques à quartiers variables.
Mais ces interactions ne sont jamais perçues par les sujets.
Tout se passe comme si le comportement oculomoteur des sujets face à la toile était structuré de façon "inconsciente" par des interactions que seul le calcul permet de révéler.

NEW POSSIBILITIES TO MEASURE COLOUR PERCEPTION

Dr. Péter Gáborjáni Budapest

Design of the illumination of an Audiovisual Laboratory involved a "light map" with

- transmission
- colour temperature
- and luminous intensity data.

The test showed such a light map to offer new methods for colour recognition measurement. Such methods are for example the life size simulation modelling, the measurement of the colour recognition in movement, the demonstration of the interrelation between colour and size invariance.

Programs of the audiovisual laboratory include the spatial modelling of the surface colour and the surface texture, and the analysis of the optical effect of colouring and of surface roughness with depth indication. This latter can be measured by any computer with graphic display.

Subtractive, Additive, Partitive .

Frans Gerritsen (NL)

A demonstration, with the use of three projectors, which compares the mixing results of: Subtractive, Additive, and Partitive'mixing'. We will show three different'mixing' results from three spectrally the same color pairs.

Soustractive, Additive, Partitive.
Démonstration avec trois projecteurs pour montrer les différences des couleurs formées par la synthèse Soustractive, Additive, et Partitive avec trois paires des couleurs spectrales identiques.

Subtraktiv, Additiv, Partitiv.
Eine Demonstration mit drei Projektoren zur Vergleichung von drei verschiedener Mischfarben, aus die Farbmischprozesse: Subtrativ, Additiv, und Partitiv, mit Spectral drei gleichwertige Mischfarbenpaare.

The demonstration shows three neutral grey surrounding fields each with a white cadre. The so-called colored 'mixing' field lies in the center of each of the three neutral grey fields. The use of the three same neutral grey surroundings allows us to compare the differences in hue, lightness and saturation of the 'mixing' colors which are formed: Subtractivly, Additivly and Partitivly.

Along with the spectral reflections, which we see as color surfaces, the spectral reflection curves will also be shown; with these curves it is possible to demonstrate: Subtractive, Additive and Partitive color formation. These different color formation principles will be illustrated with diverse practical applications.

Approcher et reconnaître la Couleur :

LAVEAUD Michel Bureau d'Etude Rousset-les-Vignes
F 26770 TAULIGNAN

- Présentation d'outils de classement à fonctions multiples : modules pour une approche contrastive
- Mise en relation d'un référentiel avec les essais et échantillons de production. - Apprentissage - Cercle de Qualité - Publicité -Productique-

Exemples d'application :

- nomenclature des couleurs et teintes
- étude de rendu des couleurs sur supports variés
- "coordonnés" (duo ou trio) au service des fabriquants, des distributeurs, des clients.
- identification des caractéristiques - (colorimétriques et de trace : nature et densité des matiéres colorantes et modes d'application) dans les reproductions d'art.
- Proposition de modéles expérimentaux conçus pour l'apprentissage de l'emploi des crayons, des pastels gras, feutres, encres, etc...
- approche macro/micrographique des taux et types de couverture colorante (recherche et formation).

Guy L'ECERF France

LA COULEUR DANS L'APPROPRIATION DE L'IMAGE PAR L'ENFANT

Dans le cadre d'une recherche de l'unité activités plastiques de l'I.N.R.P. sur la réception des enfants de l'Ecole Elémentaire, j'ai mené une étude concernant l'importance accordée à la couleur dans l'appropriation de l'image par l'enfant lorsque celui-ci se trouve en situation de production.

A partir de positionnements d'échantillons colorés effectués auprès de 569 élèves de MACON et d'ANGERS j'ai pu obtenir des résultats statistiquement significatifs.

Ceux-ci permettent de déterminer à partir de trois variables (position dans le champ de l'image, couleur, niveau de scolarité) s'il existe :

- un modèle de structuration indépendant de la variable couleur et du niveau de scolarité

- une prise en compte de la couleur dans le positionnement d'échantillons colorés

- une appropriation différente ou non de l'image lorsque ce positionnement d'échantillons colorés s'effectue sur une image ayant les traits d'images perçues quotidiennement.

Les résultats obtenus vont à l'encontre de certains lieux communs (couleur en maternelle puis déperdition...) et permettent d'envisager de nombreuses répercussions pédagogiques.

COMMENT INFORMER SUR LA COULEUR
LES VENDEURS EN PEINTURES ET REVETEMENTS

bernard VALLAT INGENIEUR - CONSEIL
3 rue de Bellevue 90300 LACHAPELLE - SOUS - CHAUX (FRANCE)

Ce type d'information concerne des vendeurs n'ayant aucune connaissance précise du domaine de la couleur. Il est nécessaire de structurer ce qu'inconsciemment ils ressentent.

Avec les participants, nous essayons de définir les éléments qui entrent en jeu dans la vision d'un objet coloré : un récepteur, un objet, de la lumière pour l'éclairer.

Avant de développer ces trois points, nous définissons les caractéristiques d'une couleur : la teinte, la luminance, la saturation, ainsi que les synthèses additive et soustractive. Ceci permet de parler du classement des couleurs.

Ensuite, nous développons précisément :

* la lumière : caractéristiques d'une source lumineuse, métamérisme
* le récepteur : l'oeil, ses malformations
  les colorimètres
* le support : caractéristiques, rôle, aspect de surface.

Suivant les demandes des participants, la session se termine par des notions d'harmonie des couleurs ; un vendeur pouvant être confronté à ces problèmes dans l'exercice de sa profession.

L'originalité de cette information réside dans la capacité de développer des notions justes d'une manière simple.

The Laws of Colour Mixture and its Use in Colour Reproduction

by Ursula Schultz, Germany

Two basic laws and its combinations allow to produce all natural colours : The a d d i t i v e law and the s u b t r a c t i v e law. The additive law of colour mixture is applicable on sensations as well as on colour stimuli,whilst the subtractive law describe the mixture of stimuli only. That means, the subtractive law belong to the properties of colored materials but not to colour vision directly. Using transparencies it is called Lambert-Beer's law, but it can be given for opac materials also using Kubelka-Munk's theory.

Between these two laws special combinations exist,last not least those relevant in printing.Beyond it,the laws of colour mixture are very important in all fields of colour reproduction.

The lecture give detailed definitions about the laws of colour mixtures.Examples from colour television, colour photography and multicolour printing illustrate the differences between the diverse laws and demonstrate the problems of colour reproduction in the diverse fields of reproduction techniques.

Prof. - CSc.

Jaroslav B r o ž e k Ústí nad Labem

Kind und Farbe

Schlussbericht über die Ergebnisse experimentaler Forschungen, wie die Kinder im Schulalter die Farben empfinden und bewerten. Der ganze Experiment verlaufte 13 Jahre bei Kindern und Jugendlichen von 7 bis 18 Jahre, sowie bei einer Kontrollgruppe von Erwachsenen und wurde bisher nur teilweise publiziert. In der Reihe von den Forschungsaufgaben wurden die kindlichen Bewertunsstellungen zu folgenden Farbmerkmalen untersucht: Benennung der Hauptfarben, Wahrnehmung des negativen Nachbilds, Bewertung der Kontrastbeziehungen der Farben, Empfinden von Hell-Dunkel- und Kalt-Warmfarbkvalitäten, Wahrnehmen der Induktionserscheinungen, Bewerten der symbolischen und sinnbildlichen Bedeutungen der Farben.

Das Referat bringt Detailergebnisse, die die Entwicklung des kindlichen Empfindens und Bewertens der Farben, dessen kvantitative und kvalitative Entfaltung als Funktion des Alters, sowie die Unterschiede im Vergleich mit Erwachsenen erläutern.

MARDI 18 JUIN
TUESDAY, JUNE 18
matin et après-midi
morning and afternoon

COMMUNICATIONS ORALES
ORAL COMMUNICATIONS

AUDITORIUM
SALLE B
SALLE C
ROOM B
ROOM C

SURVEY OF COLOR ORDER SYSTEMS

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This invited paper will survey the major color order systems that are accompanied by physical exemplifications and that are now (or were until recently) available for purchase. These include the Munsell, Natural Color, Optical Society of America, and Ostwald systems, and (less widely used worldwide) the DIN and Coloroid systems.

The discussion will include comparisons of the purposes, spacing, variables and parameters, and interrelations of the systems. It is assumed that all color order systems represent sampling of the same underlying color space, differing in one or more of the above ways. The differences seem at present to be so great that it is unlikely that any compromise system could be constructed that would satisfy the proponents of the existing systems. The properties and purposes of the various systems are so widely different that there is no basis for selecting any one of them for recommendation as an international standard color order system.

Farbmessung an lumineszierenden opaken Körperfarben nach der Zwei-Monochromatoren-Methode und unter Verwendung eines D65-Simulators

Dietrich Gundlach, K. Mäder und W. Hammer Berlin

Es werden die Ergebnisse der Farbmessung an Beispielen optisch aufgehellter Materialien und bunten Tagesleuchtfarben verglichen, die zu einem mit spektraler Anregung nach der von R.Donaldson /1/ angegebenen Zwei-Monochromatoren-Methode und zum anderen mit integraler Anregung mit Normlichtart D65 erhalten wurden. Für die Zwei-Monochromatoren-Methode wurde das neue Lumineszenz-Spektrometer der BAM benutzt. Die lumineszierende Körperfarbe wird hier unter 45° mit Strahlung einer Xenonlampe über einen Doppel-Gittermonochromator engbandig im Bereich von 300 nm bis 800 nm bestrahlt. Die unter 0° von der Probe reflektierte und emittierte Strahlung wird über einen gleichen Monochromator im gleichen Wellenlängenbereich analysiert. Die valenzmetrische Auswertung der zahlreich anfallenden Meßwerte erfordert besondere Aufmerksamkeit, da Anregungs-, Reflexions- und Emissionsmeßwerte unterschiedliche spektrale Profile zeigen, worauf zuletzt H. Minota et al. /2/ hingewiesen haben. Zur integralen Anregung der Lumineszenz mit nachfolgender spektrometrischer Messung wurde der vielkanalige D65-Simulator der BAM /3/ eingesetzt. Die Ergebnisse der Messungen nach den beiden Methoden zeigen je nach Farbbereich eine sehr gute bis gute Übereinstimmung. Die Ursachen für auftretende Abweichungen werden diskutiert werden.

/1/ Donaldson,R., J. Appl. Phys. 5 (1954) 210
/2/ Minota,H., Nanjo,M. und Nayatani,Y., Acta Chromatica 3(1979),Nr.4, 153
/3/ Gundlach,D.,Color 77, Troy,Adam Hilger (1978),218

THE CORRECT MEASUREMENT OF $\varrho(\lambda)$ and $\tau(\lambda)$ IN THE VIS OF THICK SAMPLES

Dipl.-Ing. Eike Krochmann, PRC Krochmann GmbH, Geneststraße 5, D-1000 Berlin 61

Prof.Dr.-Ing. Jürgen Krochmann, Institut für Lichttechnik der Technischen Universität Berlin, Einsteinufer 19, D-1000 Berlin 10

ZUSAMMENFASSUNG

Es wird ein Kugelphotometer zur Messung von Reflexionsgrad ϱ und Transmissionsgrad τ beschrieben, mit dem im VIS auch Spektralmessungen an dicken Proben ausgeführt werden können. Mit diesem Gerät ermittelte Meßergebnisse werden denen mit anderen Geräten bestimmten gegenübergestellt.

RESUME

Ici on décrit un photomètre à sphère pour mesurer les facteurs de réflexion, ϱ, et de transmission, τ, avec lequel on peut aussi bien exécuter des mesures spectrales dans la region visible, sur des échantillons épais. On compare les résultats de mesure que l'on a obtenus avec cet appareil et ceux déterminés avec des autres instruments.

Quality characteristics for tristimulus colorimeters

Dr.-Ing. Reiner Rattunde
Dipl.-Ing. Frank Rochow

The Technical Committee 2.2 of the CIE has installed a working group developing a report on methods of characterizing the performance of tristimulus colorimeters.
Several suggestions or quality parameters have been made in the past.
A research on a large number of high precise tristimulus colorimeters was made to detect the connection between global quality parameters and real measurement errors. The results are demonstrated.
It is shown how the accuracy is strongly dependent on the calibration. A new calibration routine shows much better results on color measurements, especially at cathod ray tubes for TV and computer screens.

GRUM F. MILLER N. USA

Spectrogoniophotometric Characterization of SRM's for Colorimetry

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A spectrogoniophotometer was developed and used in the characterization of standard reference materials used in colorimetry. The instrument covers the spectral range of 380 - 780 nm with possibility to extend down to 300 nm and up to 1000 nm. The angular span is from 5 to 75 degrees to the sample normal, hence covering the most important angular range. Another feature of the spectrogoniophotometer is that it can be also used in the transmission mode and has the means to control the temperature of the test samples.

The samples include the commonly used white reflecting materials such as barium sulphate, Halon, and white opal glasses. Among the colored materials are the BCRA tiles.

The measurement of reflectance factor includes the spectral range of 380 - 780 nm with 5 nm spectral intervals and at 5 degree angular intervals.

The measurements were made on the absolute scale and the incident light was polarization corrected. Particular attention was paid to 0/45 degree CIE geometry and its recommended tolerances.

A COLORIMETER FOR COLORED GEMSTONES

J. J. Rennilson and W. N. Hale, Jr.

Colored gemstones cover the full range of the color universe, and it is desirable to be able to specify their color for both indentification and communication purposes. Due to their optical complexity, color measuring instruments used with other specimens are not satisfactory.

A tristimulus colorimeter has been adapted to provide unique illuminating and viewing conditions which permit measurement accuracy and precision not heretofore possible. The instrument is portable and capable of being operated by non-technical personnel. Data are reported in CIE and CIELAB.

COLORIMETRE POUR PIERRES PRECIEUSES DE COULEUR

Un colorimetre portatif, a tristimulus, a ete modifie de facon a permettre d'effectuer des mesures tres precises des couleurs des pierres precieuses, repondant ainsi a un besoin, existant de longue date dans ce domaine, se specifications de couleurs et d'information precises. Ces informations sont en CIE et CIELAB.

EIN DREIBEREICHS-FARBMEßGERÄT FÜR FARBIGE EDELSTEINE

Ein tragbares Dreibereichs-Farbmeßgerät ist verändert worden, so daß es fähig ist, genaue Farbmessungen von farbigen Edelsteinen zu machen, das sich damit befaßt, ein langjähriges Bedürfnis für genaue Farbspezifizierung und Veröffentlichung auf diesem Gebiet zu schaffen. Data sind in CIE und CIELAB.

Fluorescent Metameric Samples for Testing Daylight Simulators

Takashi Ichijo and Leo Mori, Kawasaki (Japan)
and Yasuhiro Nagata, Tokyo (Japan)

A new metameric pair consisting of two fluorescent color chips was developed. This is useful to assess visually the quality of simulators of the standard illuminant D_{65}.

A new fluorescent metameric pair for the standard illuminant D_{65} has been developed. It consists of two color chips containing phosphors, one emitting blue light excited by ultraviolet radiation, and the other emitting orange light excited mainly by green radiation.
This metameric pair enlarges several times as much color difference as the conventional non-fluorescent pair, when the illuminant differs from the standard illuminant.
Besides, this pair causes color difference by the difference of the illuminant in not only visible range but ultraviolet range.
The CIELAB color difference of the pair for the CIE 1964 supplementary standard observer under the illuminant D_{65}, its simulator by the fluorescent lamp[1], the illuminant C and the Xe light source according to Japanese Industrial Standard are 0.2, 0.4, 1.4, and 1.0, respectively.
The method for colorimetric measurement of fluorescent materials, by use of one monochromator method, is also described in relation to this fluorescent metameric samples.

ref.1) L. Mori, et al.: CIE 20th Sess. (1983) D111.

MEASURING WHAT WE SEE - A NEW SYSTEM OF COLORIMETRY

M.R.POINTER - HUNT R.W.G.
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Traditional colorimetry has been with us for a number of years - the 1931 Standard Colorimetric Observer celebrated its 50th birthday in 1981. The CIE system of colour measurement has proved of use in many areas but it is not capable of giving a measure of what an individual colour actually looks like in a particular, defined environment. This short-coming has been rectified with the design of a model that empirically simulates the signal processing in the eye to give a metric in terms of the appearance attributes of a colour, e.g. the hue, colourfulness, and lightness. This paper will demonstrate the limitations of the 1931 system, outline the basic building blocks of the model and show how the model could be applied to the assessment of the colour rendering capabilities of light sources.

VISION DES COULEURS
THEORIE UNIFIANTE _ NOTION DE TEMPS ET D'ENERGIE

PELISSIER CLAUDE Chateau de Cunault 49350 GENNES

L'unification formelle des théories de Young-Helmholtz et Héring, effectuée à partir du fondement de la photométrie hétérochrome, implique la substitution de la loi de " mélange " des couleurs par une loi non linéaire . Cette modification permet: d'envisager la théorie de Y-H comme une approximation parfois suffisante (colorimétrie) : d'obtenir les repères particuliers de la théorie de Héring ainsi que les effets de désaturation , de Bezold-Brucke etc .De plus en utilisant la définition linéaire de la luminance, la structure de l'espace des couleurs est presque métrique ce qui rapproche les points de vue de Mc Adam et F Parra relatifs aux seuils différentiels de couleurs. La nouvelle loi ne contient que des rapports de luminance ce qui confirme les idées de H Land . L'espace des couleurs est autonome par rapport à l'espace des stimuli .

L'aspect heuristique de la théorie est alors développé. Le concept de luminance se décompose en énergie et temps, ainsi se dégage la notion de phénomène énergico-temporel. Le repérage de ces phénomènes peut être objectif (utilisation d'appareils classiques pour effectuer les mesures des durées et des quantités d'énergie) oubien visuel . A chaque état d'adaptation est alors associé un repère particulier de l'ensemble temps-énergie . En conséquence, pour le système visuel, ces notions sont relatives et équivalentes. Ainsi, suivant l'état d'adaptation , le découpage en énergie et en durée d'un phénomène est variable , il n'existe pas de discrimination temporelle entre la stimulation et la perception ce qui implique l'existence d'un seuil différentiel(loi de Weber) ...Le rapport usuel de l'humain à son univers se trouve modifié .

Transient effect of chromatic contribution to brightness.

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The need has been pointed out to establish a new spectral luminous efficency function based on the heterochromatic direct brightness matching. It is important, however, to investigate the effect of various experimental conditions upon the shape of the function before we come to a final conclusion about the function. The function normally exhibits double peaks at about 540nm and 600nm, quite different from the smooth CIE $V(\lambda)$ curve. The difference is explained by the contribution from the chromatic channel. In the present experiment, we found that the double peaks became further pronounced when the stimulus duration was shortened to 1 sec compared to the steady presentation. This implies that the contribution of the chromatic channels to the brightness increases for shorter stimulus durations. The brigthness spectral luminous efficency functions will be explained in terms of the transient effect of the chromatic channels.

Temporal Frequency Characteristics of Colour Vision

Hiroshi Komatsu, Sendai, Japan

Temporal frequency characteristics of colour vision were examinened by measuring CFF deviations after brief adaptation to intermittent spectral light. The apparent temporal wave forms of the stimuli were sinusoidal. The amplitude of the sine wave was adjusted to obtain a stimulus frequency of 30Hz to CFF.

Results : 1) When spectral lights(adapting lights) and white light(measuring light) were used, the peak frequencies of the adaptive effects were 10-12.5Hz for blue(446nm,468nm), approx. 15Hz for green(500nm,535nm,545nm) and 17.5-20Hz for red(600nm,640nm). 2) Individual differences were relatively large for the yellowish adapting lights. Certain Ss showed a main peak at 16 or 17Hz, and others at 16 and 19-20Hz bimodially. 3) Adaptive effects of white light were more effective than chromatic adaptation in general, and showed peaks in the frequency ranges of 8-10, 17.5-20, and 35-40Hz. These three peaks became more prominent by subtracting four curves of blue, green, yellow and red from the white-light adaptation curve. 4) Colour-deficient Ss showed unique responses to wave lengths of defective colour.

Chromatic Broca-Sulzer Phenomenon

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Summary

Effect of flash duration upon perceived hue shift has been investigated using unique-blue, -green, -yellow, and non-unique hue flash. By using three-channel Maxwellian optical system, flash duration was changed from 1 to 4 log msec with several illuminance levels. The observer was asked to maintain unique-hue whenever duration changed.

The results showed (1) unique-hue is independent of time above 1 sec but is depend on time below 500 msec and (2) the Broca-Sulzer brightness enhancement phenomenon is observed only for unique-hues but not for non-unique-hues, furthermore, (3) the adjusted spectral loci for unique-blue and -green significantly shift due to the Broca-Sulzer effect. The results were discussed in terms of different hue and luminance coding characteristics within an opponent color coding mechanisms.

Perceptual latencies for exchange of spectral lights in equal luminance

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Ibaraki 305, Japan

Perceptual latencies for spectral lights briefly exchanged for monochromatic backgrounds without luminance transients, that is in hue substitution, were determined. By the method of perceived order judgement of the color replacements in test and reference field, the latencies were obtained in values relative to the latency for 629 nm spectral light exchanged for achromatic background. As a result of comparing the latencies for spectral lights exchanged for monochromatic backgrounds with those for achromatic background, the sharp extension of the latency at near 570 nm seen for the achromatic background disappeared for the monochromatic backgrounds. The wavelength effect of latency would be considered in connection with the chromatic responses of the visual system.

Die Wahrnehmungszeit für die Spektrallichter, die wurde für die einfarbige Hintergründe ohne die Leuchtensvariation getauschen, wurde gebestimmen.

Latence perceptive pour des lumières spectrales qui ont été échangées brièvement contre des arrière-plans monochromatiques sans transition lumineuse a été determinée.

Effet des stimulations colorées sur les potentiels évoqués visuels .

Y. GRALL . F. RIGAUDIERE . G. FROMONT .

La stimulation la plus utilisée actuellement tant en recherche qu'en exploration fonctionnelle pour obtenir un potentiel évoqué visuel est un damier alternant noir/blanc .

Très peu d'expériences ont été menées avec des damiers alternants couleur du fait des difficultés d'obtention . Le générateur de plages colorimétriques que nous utilisons (réalisation CNAM) couplé à un moniteur télévision et à un système informatique nous permet d'obtenir facilement des damiers alternants de structure et taille variable avec des couleurs de coordonnées trichromatiques et de niveaux lumineux précis et reproductibles . Il nous a semblé intéressant de proposer les résultats de notre étude concernant l'impact de la variable couleur sur la réponse évoquée visuelle (PEV) chez des sujets normaux mais aussi chez des dyschromates , à l'aide de damiers alternants identiques en structure pour chaque couleur et en référence à des PEV évoqués par des damiers noir/blanc de même niveau lumineux .

Messung der Kontrastschwelle des menschlichen Auges für farbige Objekte

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Eine Apparatur zur Messung der Kontrastschwelle des menschlichen Auges wurde entwickelt. Vorteile dieser Apparatur sind eine rasche und direkte Messung sowie eine ziemlich kontinuerliche Änderung der dargebotenen Kontraste. Bei jeder Messung werden der Testperson acht verschiedene negative Kontraste dargeboten, sodaß immer wenigstens einer von ihnen sichtbar und ein anderer unsichtbar ist. Diese acht runde Objekte bilden einen Kreis auf dem Projektionsschirm und sind zufallsmäßig angeordnet. Der Kreis läßt sich drehen, sodaß die Lage der Objekte bei verschiedenen Messungen geändert werden kann, die relative Position der Objekte bleibt jedoch unverändert. Bei einem akustischem Zeichen ermittelt die Testperson die Zahl der sichtbaren Objekte und ihre Lage. Da gleichzeitig auch die Lage der Objekte angegeben wird, ist eine zusätzliche Kontrolle der Richtigkeit der Antwort möglich. Als Kontrastschwelle wird der mittlere Wert der Kontraste des letzten sichtbaren und ersten unsichtbaren Objektes betrachtet.
Diese Apparatur wurde mit Erfolg für farbneutrale Objekte getestet. Die Ergebnisse stimmen mit den berühmten Messungen von Blackwell überein. Durch das Einsetzen von Farbfiltern konnte diese Apparatur zur Messung der Kontrastschwelle für farbige Objekte verwendet werden. Die sich daraus ergebenden Daten werden verglichen und Schlüsse daraus gezogen, wie die Kontrastschwelle von der Farbe abhängt.

Hue difference threshold for binocular fusion

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Binocular color fusion can be achived only when the hue difference between the two eyes is relatively small. Otherwise a spatially and/or temporally inhomogeneous perception, called rivalry, takes place. In the present study wavelength difference threshold for binocular fusion, denoted as $\Delta\lambda$, was measured as a function of wavelength for equibrightness stimuli. The threshold $\Delta\lambda$ was determined by the method of adjustment by presenting a 8° field to each eye foveally and gradually separating the wavelengths of the right and left eye stimuli until the binocular field just turned out inhomogeneous in hue. Four brightness levels covering photopic to scotopic visions were adopted.

The threshold $\Delta\lambda$ was found to be in the range from 10 to 70 nm in photopic vision and to have two minima, one at 490 nm and the other 590 nm, when plotted along the wavelength axis. While for mesopic and scotopic visions the threshold was much larger ranging 20 to 200 nm with one minima at 590 nm. These data were interpreted in terms of a constant distance in uniform color scale and also a constant chromatic difference based on the opponent-color theory.

A practical study about optimum chromatic encoding in grey levels pseudocoloring.

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In the chromatic encoding, particularly in the grey level pseudocoloring, it is interesting to see, before, which color filters will give more information.

In spite of using transparent color filters, we have worked with the CIE Color space CIELAB 1976 (K. McLaren), where we assume, in principle, an admissible uniformity (A.R. Roberston, M.R. Pointer R.G. Kuehni).

This paper explains a microprocessor programmed method, to determine the optimum pair color filters giving a mixture which representative point in the CIELAB color space is equidistant of the points representing each filter. If to this mixture point we assign the "medium" grey (amplitude transmittance 0.5), the grey levels included between 0 and 0.5 will be chromaticly encoded into a curve (which will never be a straight line). This curve will go from the mixture points to the corresponding point of one filter; and will be approximately equal to another curve going from the mixture point to the other filter. The second curve encodes the grey levels included in the range 0.5-1. Hence, the two intervals give a similar color grade leading to a chromatic scale optimization corresponding to the grey levels.

Brightness of object colors illuminated by fluorescent lamps with high color rendering properties

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Brightness perception of object colors is affected by the change of color rendering property of illuminating source, even though the illuminance is kept constant. The cause of this phenomenon was studied by a subjective experiment , specifically relating to the Helmholtz-Kohlraush effect studied by C.L.Sanders et al. and W.A.Thronton.

The subjective experiment was done for various object colors by using three kinds of fluorescent lamps with the general color rendering indies Ra of 64, 84, and 87.

Results are summarized as follows.

(1) The effect of color rendering properties of lighting sources on brightness of object colors is larger than that predicted by the Helmholtz-Kohlraush effect studied by C.L.Sanders et al.

(2) The brightness equation proposed by W.A.Thornton is inadequate.

(3) Brightness of object color is perceived to increase for an increase of its metric chroma by changing illuminating fluorescent lamps from low to high Ra value.

Evidence for the Virtual Spectral Responses of the Normal Human Visual System

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The mathematics of color-matching suggests that one is not necessarily able to determine the three actual spectral responses of the human visual system. However, data from professional human color-matching experts do, under certain simple conditions, yield information directly revealing what may be called the 'virtual' spectral peaks of visual-system response. In support of this: Observation 1. Simple white lights, which are pronounced a match by a three-input device having three simple, slightly-overlapping spectral responses, intersect at three wavelengths near the peaks of those responses. Observation 2. Although there are many practical reasons why lights which match to human observers may intersect at more than three wavelengths, it is common that such matching lights intersect at exactly three wavelengths. Observation 3. In the BAYER sample sets MV68 and AA17 (around 1970), there are 317 matching pairs in 51 colors. Of these 317 pairs, 100 intersect at three wavelengths. For these 100 pairs, average wavelengths of intersection and (mean deviations) are: 458 nm (5 nm), 541 nm (7 nm), and 611 nm (7 nm). It will be argued that these are the virtual peaks of human visual-system response.

THE G. PALMER STORY, CONTINUED

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The three-receptor hypothesis for human colour vision, the loss theory of colour blindness, the concept of independently fatiguable visual sub-channels, the idea of artificial daylight - all these were introduced between 1777 and 1786 by a mysterious figure who was fluent in both French and English and who appears under the names Giros von Gentilly, Girod de Chantilly and George Palmer. von Gentilly was both a physical and a physiological trichromatist and he represents an important transitional stage in the understanding of trichromacy. His writings were known to Thomas Young, who put forward his strictly physiological theory in 1801. In an engaging paper (J. Hist. Med., 1956, 11, 66) Gordon Walls describes how he discovered von Gentilly's monographs and recounts how he searched long and fruitlessly for the man's identity (see also MacAdam, D. L., 1970, *Sources of Color Science* pp 40-50). After an extended search of civil and trade records in England and France, I now know the identity of 'G. Palmer'. A crucial clue is provided by his previously unknown pamphlet 'Lettre sur les moyens de produire, la nuit, une lumière pareille à celle du jour'.

A COLOUR COMBINATION THEORY FOR A HUMAN ENVIRONMENT -probability of NCS beeing a workable and valuable bases

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From an echological angle of approach the NCS represents a conceptual structure that describes how the human colour sense translates attributes of the outer physical world into descriptive colour perceptions giving a remarcable amount of information about the world man lives in. So it seems probable that NCS also could be a bases for the characterizition of the Colour Gestalt.

The NCS colour space can logically be devided into a number of subspaces by dividing the scales in halfs.In a subspace all colours have the same characteristic **analog similarity** in the sense that the order in which the MAIN- and SUB- attributes appears will be the same. All such colours represent variations of the same theme or color class.
The perception of the form gestalt is a function of the distinctness of the percieved borderline between adjacent colour objects. And this **distinctness of border** has been shawn to be a power function of the added color differences expressed in NCS units.
In the NCS model it is also possible to locate colours that have percieved **degree similaritiy** or **proportional similarity** of the elementary colour attributes.
Some therminology has to be established for a meaningful communication about the perceptual phenomenon here called THE COLOUR GESTALT. And based on that is designed an analytical,structuring model for a colour combinatoric theory free from dogmatic evaluations. The model has three maindimensions called 1. THE COLOUR CHORD 2. THE COLOUR INTERVAL and 3. THE COLOUR HARMONIZATION.With the help of this model colour aestetics could be studied and analyzed.
A theory of colour composition show similarities with linguistics and might be lead to a new approach to how colours can be used as visual means of expression and communication within the MAN BUILT ENVIRONMENT for a more human colour world to live in.

NCS, une méthode pour la mesure descriptive des couleurs.

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La couleur est une perception et la mesure des couleurs une mesure de perception, qui doit être faite par des méthodes psychométriques. Mais la colorimétrie instrumentale est une mesure physique du rayonnement, reliée à la perception par des fonctions colorimétriques obtenues par une égalisation visuelle des couleurs présentées dans un colorimètre. Ainsi les coordonnées colorimétriques indiquent quels stimuli de couleur vont produire - en pénétrant dans l'oeil - des sensations de couleurs identiques, mais ils ne décrisent pas l'apparence de ces sensations.

Le NCS (Système Naturel des Couleurs) est une méthode descriptive pour mesurer les couleurs, fondée sur les six perceptions de couleurs élémentaires qui n'ont aucune ressemblance entre elles. Un observateur peut décrire une couleur arbitraire par ses ressemblances avec ces couleurs élémentaires - sans avoir à sa disposition aucun échantillon de référence.

Il faut faire une distinction entre un système de couleurs, où on peut définir chaque couleur concevable par sa position dans le système, et une collection d'échantillons (montés dans un atlas ou en feuillets mobiles) qui a pour but d'illustrer le système. Cette illustration n'est valable que pour une seule combinaison d'éclairage et d'observation.

Dans un système naturel, ce n'est pas le stimulus physique, mais la couleur perçue, qui est définie par une notation logique. En conséquence, un échantillon, vu dans des ambiances et des éclairages différents, reçoit des notations différentes . Cela peut être utilisé pour explorer le rendu des couleurs, l'adaptation chromatique, l'induction chromatique, etc.

COSMOLOGIE DE LA COULEUR

Michel ALBERT-VANEL PARIS

Nous avons hérité du découpage historique entre Science , Art et Philosophie. Il s'agit d'un carcan, dont nous avons bien du mal à nous défaire, malgré des craquements de plus en plus évidents.
Ce découpage est, en effet, caduc et l'on peut penser que dans un proche avenir les recherches les plus fructueuses se feront justement sur ces lignes de failles, au croisement entre disciplines jusqu'alors séparées.
Ainsi on peut se demander si la classification des couleurs ne peut s'apparenter à la biologie ou à la botanique.
On peut également rechercher des similitudes au travers des époques, avec des savoirs plus ou moins oubliés ou tombés en désuétude, comme l'Alchimie.

Enfin on peut trouver des analogies curieuses à travers des milieux géographiquement éloignés et en particulier ceux de l'Orient: Boudhisme, Taoisme, Tantrisme...
Tout cela met en évidence une certaine permanence du phénomène couleur à travers les époques et les lieux géographiques.
Les interprétations différentes retrouvent une unité à un niveau de complexité plus élevé. Pour cela il faut oublier l' anecdote et s'en tenir à la couleur elle-même; en tant que véhicule de l'information. S'en tenir à la couleur d'une manière quasi structurale, c'est retrouver une cosmologie d'une pureté plus grande, car dépouillée de bien des particularismes propres à chaque culture et des anachronismes, propres à chaque époque.
On constate alors, avec étonnement, que la couleur est aussi description de l'univers: unité de l'ensemble et du détail, relativité de l'élémentaire à la globalité....

THE CONCEPT OF LIGHTNESS RATIO OF HUES IN COLOUR COMBINATION THEORY

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Having in mind Wilhelm Ostwald's theory on harmony of colours and his colour scales being of the same hue, Aemilius Müller, Winterthur (born 1901), showed already during the fourties that such scales can be made more attractive by using systematic deviation in hue. According to Müller colour combinations of different hues can only be harmonious if they correspond to the natural lightness ratios of hues as performed e.g. in his hue-circle. The inversion of natural lightness ratios of different hues is for Müller a definition of colour disharmony and even a sign for bad colour taste.

This paper proposes:

1. to overcome this dogmatic attitude,
2. to describe probably existing differences in characterization between so-called "good" and "bad" hue deviations by means of semantic differentials,
3. to study the limits of differing characterization,
4. to define this phenomenon more precisely by using the perceptive parameters whiteness and blackness for expressing nuance-intervals.

The author of this paper, who is a colour designer, hopes that scientific research will be carried out in this field of colour aesthetics.

Evaluation of Colour Combinations

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Within a long-running project called Colour-Man-Environment, supported by the Swedish Council of Building Research, a subproject has been started to investigate into problems of colour combinations.

The number of possible colour combinations is uncountable and this is perhaps the reason why so little scientific research has been done in this field. Consequently it was first necessary to try to make a formal structure - a descriptive language for colours in interaction. Such a theoretical colour-combinative model, based on the Swedish Colour Standard for Colour description NCS, has been suggested (mainly by Anders Hård) and tested as to its practical and hypothesis-generating value. It contains three main dimensions: Interval, Chord and Order(Harmonics); each of which having three subdimensions.

The model is purely descriptive and a priori non-evaluative. But it can be used as a base for investigations of such issues. Our first evaluative study has shown that subjects are sufficiently concordant so that significant differences occur between the test-combinations. Three different groups of people were tested of which two were Swedish and one English; The agreement among the groups was more notable than the differences. The results were possible to interpret in relation to the combinative model; in this first study the following subdimensions were found to influence the aesthetical value, namely the inter-colour similarities of hue, chromaticness, saturation, whiteness and blackness.

Differences between people were of course also found and the next study is designed to analyse these, possibly in relation to attitude-, personality- and other differential variables.

Color-Tone Diagram and Color-Tones of Two-Color Arrangements

Sadao Nakamura
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The spectral reflectances for the entire area of each multicolor arrangement are specified by the four reflectances in the four-primary-color regions. The corresponding wavelengths are determined by measuring 187 paintings in the art books of four impressionists and by the spectral features of common colorants. By normalizing the four reflectances regarding to the properties of lightness and saturation, two color-tone coordinates are derived, which construct a color-tone diagram. When applied also to single colors, the diagram is divided radially by hue names and single colors situate near the outermost periphery. From the measurements of the 187 paintings the diagram is divided peripherally by the multicolor degrees of color arrangement. Inner portions include color-tones for arrangements of multicolor type. Main color-tones of two-color arrangement are classified in the diagram for 740 color arrangements selected from works in the art books of nine modern painters and in a journal of graphic art.

Information in color

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It is hardly an exaggeration to state that the technical developments in the area of color graphics have by far bypassed the know how in the perceptual domain, necessary to aplly this technology in such a way that it is an improvement as compared to the use of monochrome displays. It is easily possible to present information in different colors on a screen, it is less easy to give the rules for optimal choices of the colors and brightnesses.
In the study to be dealt with here, attention is paid to a special class of information,i.e. presentation of peaces of information which partly overlap each other. One could think of cartographic maps, or of presentation of three dimensional information. Colors and brightnesses must be chosen such that information over the overlapping areas is maximally available. It is hypothesized that brightnesses must obey transparency rules, which can easily be formulated. For color the overlapping parts must have the color of the additive mixture of the overlapping components. Empirical tests will be presented.

MEASUREMENT OF "GRANNY SMITH" APPLE COLOUR AND DEVELOPMENT OF A COLOUR TEST CHART FOR QUALITY CONTROL

R.D. LOZANO and C. MELCON DE BELLORA

As part of a program dedicated to study food colour related problems, arised the requirement of a quality classification method for "Granny Smith" green apples, produced and exported by Argentina.

The first part of the study was dedicated to establishing the colour variability space of the produce during the harvest.

The minimum square ellipse of the measured values was found in the second part, as well as the critical points determining the tolerance for the produce classification.

The developed colour test chart was used in a third part to test the effectiveness and applicability of the proposed method and will be applied to the next crop.

Mathematical and statistical studies have been carried out and correlations found, which concur to determine a colour tolerance space for specifying the quality of the produce.

A description of the obtained results is given.

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UN COLORANT ALIMENTAIRE MECONNU: L'ANNATTO

Claudette BERSET et Claire MARTY ENSIA MASSY

L'annatto ou rocou est un colorant naturel utilisé dans divers secteurs de l'industrie alimentaire et principalement en laiterie et fromagerie. Le pigment majeur ou bixine est un caroténoïde acyclique en C_{25} qui présente une polarité moyenne et une certaine solubilité dans les milieux lipidiques ou aqueux. Par ailleurs, la bonne résistance aux traitements thermiques et le prix peu élevé de l'annatto lui permettent de rivaliser avec les colorants synthétiques

Nous présentons quelques aspects de la stabilité thermique de poudres colorantes préparées au laboratoire à partir des graines de rocouyer.

Le colorant,en solution dans l'huile,résiste bien à un chauffage prolongé à 120°C. Il est peu dégradé par un passage à l'autoclave, ce qui assure une bonne conservation des poudres. Enfin il présente une remarquable tenue à la cuisson-extrusion, supérieure à celle qui a été observée avec d'autres pigments caroténoïdes.Les pertes en substance colorante enregistrées sur des produits modèles à base d'amidon de maïs n'excèdent pas 15% immédiatement aprés la cuisson-extrusion et 30% aprés huit mois de conservation des extrudats à température ambiante. On enregistre toutefois,au cours du temps, une déformation du spectre d'absorption des pigments traduisant des modifications de structure chimique actuellement en cours d'étude.

La colorimétrie tristimulaire constitue un moyen simple et efficace pour suivre l'évolution de la couleur des extrudats. Une corrélation étroite entre la teneur en pigments totaux résiduels et l'indice de saturation défini dans le système CIELAB 1976 a pu être établie.

LA COULEUR DES VINS DE CHAMPAGNE - MESURE ET INTERPRETATION

A. GUSTIN, J.P. MOULIN, A. FENEUIL, L. MOURCELY
Services Techniques du CIVC - EPERNAY

Dans ce travail, seront précisées les limites de la couleur des vins de Champagne et son évolution au cours du vieillissement.

Trois techniques de mesure et d'expression des résultats seront comparées :

- mesure de DO 420 nm et 520 nm
- valeur de l'intensité colorante (DO 420 + DO 520) et de la nuance $\frac{DO\ 420}{DO\ 520}$
- coordonnées tristimulaires x, y.

A partir d'une série de 59 champagnes dans chacun des plans définis par ces couples de paramètres, on déterminera le plan ou la carte de la population qui décrit le mieux les commentaires visuels des dégustateurs.

La pertinence du modèle descriptif retenu sera appréciée d'une part à partir d'une seconde population de 63 champagnes ayant été commentés visuellement par un second jury de dégustation, et d'autre part en superposant à la population précédente une troisième série de 63 champagnes.

On tentera ensuite de définir l'évolution type des champagnes en repérant la couleur d'une série de vins au cours de leur vieillissement.

CHROMATIC SYSTEMS IN VOLUMETRIC COLOUR TRANSITIONS

J. Martinez Calatayud – M. C. Pascual Martí – J.M. Artigas Verde
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Titrations remains at present, as one of the most useful methods in analytical chemistry. Any titration requires the use of one or several indicators in order to detect the end-point; such detection is based on the transition colour in the equivalence-point vicinity. Mostly of recommended indicators have not a clear transition, which means – lack of accuracy and, there is not an objective criterion in order – to select the most adequate indicator (from the different recommended in bibliography) for one specific analysis.

In this communication the experimental titration work in the author laboratory is the basis of a critical comparative study between several chromatic systems: CIE 1960; CIE $L^* a^* b^*$; CIE 1931; and, RUCS, in order to recommend the best for analytical purposes.

MARDI 18 JUIN
TUESDAY, JUNE 18

COMMUNICATIONS AFFICHEES
POSTER COMMUNICATIONS

SALLE DES POSTERS
POSTER ROOM

SESSION 2

The Investigation of Whiteness in China

Tai-Huo Dong* Lan -Chang Xie**
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ABSTRACT. Perhaps this paper is a first time information about the status and achievement of study of whiteness in China. The topics in studying are:whiteness theory and phynomenon in physics, psychophysics and colorimetry; whiteness formulae and industrial standards using in China; the theory, structure, type and accuracy of China designed and fabricated whiteness measuring apparatuses; and the scientific activities of whiteness, as well as FWAs are described. All of these may be interested by the whiteness-working fellows worldwidely.

Questions théoriques et pratiques du système de couleurs Coloroid

Dr. Antal Nemcsics

L'architecte - en élaborant ses projets - cherche l'harmonie des couleurs de nuances, de saturation et de luminosité différentes. Pour son travail il a besoin d'un système de couleurs aux échelles uniformes pour les grandes différences de couleur. Par contre, l'uniformité d'après sensation des systèmes de couleurs connus vise les petites différemces de couleur. C'est ce qui a rendu nécessaire de créer le système de couleurs Coloroid. A propos de l'espace de couleurs du Coloroid l'auteur a introduit la notion de l'intervalle d'harmonie. Les échelons des échelles du Coloroid sont des produits des intervalles d'harmonie par le même nombre. Un groupe de chercheurs de l'Université Technique de Budapest, dirigé par l'auteur, a développé dans les années 1967-71 les échelles psychométriques de l'espace de couleurs esthétiquement uniforme du Coloroid, avec la collaboration de 14 650 personnes expérimentales. Après un dépouillement très varié des données d'expéreince, on a fixé le système Coloroid comme transformation non linéaire du système CIE XYZ, en l'an 1979. L'Office de Standardisation Hongrois l'a publié en 1982. Jusqu'à présent 41 ouvrages traitant le système ont été publiés en sept langues. L'introduction dans la pratique de conception des projets a pris son commencement. Sous ce rapport il a l'avantage que les indices de couleur du Coloroid, exprimant les paramètres des sensations de couleur des groupes de couleurs harmonieuses, forment des séries arithmétiques ou géométriques. En Hongrie on a introduit l'étude du système Coloroid dans l'enseignement primaire, secondaire et supérieur.

EXPOSE : Dr SOEHNGEN E. MERCK D6100 DARMSTADT

TITRE : PEARL LUSTRE PIGMENTS IN DECORATIVE COSMETICS

Dans le domaine de la cosmetique décorative, il existe trois types de pigments perlescents :

- la guanine ou essence d'orient naturelle, (pigment nacrant naturel).

- L'oxychlorure de Bismuth

- Les pigments à base de mica enrobés de dioxyde de titane.

Les pigments nacrants peuvent être incorporés dans tout type de formule de cosmétique décorative.

Leur utilisation est particulièrement connue dans les vernis à ongles, les rouges à lèvres, les fards à paupières, etc...

THE CALIBRATION OF INDUSTRIAL SPECTROPHOTOMETERS AND COLORIMETERS FOR PRECISION AND ACCURACY

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Summary

In recent years the performance of commercially available spectrophotometers and colorimeters has improved greatly. Hundreds of these instruments are in use throughout the various industries. Burlington Industries, operating in the textile industry, is using some fifty instruments in daily activity covering a range from color matching through color sorting and grading. The inter-relation of these instruments for precision and accuracy is an essential ingredient of successful color control. While the three filter colorimeter can be controlled for precision, it offers little in the way of accuracy. In general, most spectrophotometers give less precision than colorimeters, but can be controlled for accuracy. Procedures in current use are discussed and questions are raised concerning future needs for calibration and instrument quality. To date, it has proven extremely difficult to make any two instruments, regardless of source, agree closely on both accuracy and precision. Work towards this goal needs to be accelerated.

Spectrotest, ein modernes Gerät zur Bestimmung der Spektralwert-Kurven des Farbensehens

Prof.Dr. Manfred Richter, Berlin(West)

Die Spektralwert-Kurven sind die physiologische Grundlage des menschlichen Farbensehens und deshalb von verschiedenen Seiten her interessant und wichtig: erstens für die Farbmetrik zum Studium der individuellen Varianten der Beobachter in Wissenschaft und Praxis, zweitens zur Gewinnung genauerer Kenntnisse über die Natur der ererbten oder erworbenen Farbenfehlsichtigkeiten der Patienten, drittens zur Erkennung und zum Studium der Auswirkungen äußerer Einflüsse auf das Farbensehen (z.B. von neuen Medikamenten, von Drogen usw.).

Für solche Untersuchungen standen bisher nur sehr komplizierte und teure Geräte zur Verfügung, und sie erforderten besonders vorgebildete Untersucher. Deshalb konnten systematische Bestimmungen der vollständigen spektralen Empfindlichkeiten des Zapfenapparates nur selten und nur in bevorzugten Laboratorien und Kliniken durchgeführt werden.

Das hier vorgestellte Gerät "Spektrotest" (Hersteller: Schmidt & Haensch, Berlin) dient zur Bestimmung der spektralen Empfindlichkeit des Zapfenapparates nach dem bekannten farbmetrischen Prinzip der Einstellung spektraler Farbgleichungen. Die Spektrallichter werden mittels Interferenzfiltern erzeugt. Vier verschiedene Gesichtsfeldgrößen sind vorgesehen. Die Meßergebnisse werden mit Hilfe einer Photodiode angezeigt, und für eine einfache Auswertung ist Sorge getragen.

Color Wheels that Reverse Chromatic Order with Change of Illuminant.

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It is theoretically possible to design a color wheel with six spectral reflectances such that, by interchanging two three-band illuminants, the spectral order of the hues in the color wheel will reverse. This would be a compelling display of violation of color constancy, and would show the decisive effect of illumination on color rendering. The display would be more effective than even the interchange between a full-spectrum yellow lamp and a low-pressure sodium lamp (which expands and collapses the chromaticity gamut but does not turn the gamut inside out). To achieve the inversion, one must specify the spectral reflectances at only the six wavelengths of the two three-band lamps. For example, let each of six reflectances be represented as a string of six 1s and 0s corresponding respectively to the following wavelengths (in nm): 450, 490, 540, 580, 610, 660. These wavelengths alternate between Thornton's prime and antiprime spectral bands [W. A. Thornton, J. Opt. Soc. Am. 61 (1971), 1155-1163]. One of six alternative reversible color wheels obtained in this way is specified by

100001; 101101; 001100; 011110; 010010; 110011.

Under a prime-color lamp, the color sequence should be blue-violet, blue-green, green, yellow, orange-red, and purple. Under an antiprime lamp, the sequence should be deep-red, orange, yellow, greenish-white, blue-green, and purplish white. We are developing a display based on the above principles for educational and demonstration purposes.

MISE A L'EPREUVE EXPERIMENTALE DE LA THEORIE DE LA RELATION COULEUR-FORME DU BAUHAUS.

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Kandinsky (Bauhaus) a developpé une théorie de l'art sur la sémantique des formes et des couleurs qui s'imposent comme des variables psychologiques entant en interaction. C'est par l'intermédiaire de l'étude du champ sémantique que la psychologie expérimentale peut permettre de retrouver certaines associations forme/couleur prévues par Kandinsky. Cette théorie implique-t-elle une innéité de la relation forme-couleur ou n'est-elle que le reflet d'apprentissages dans un milieu culturellement déterminé?
METHODE : 200 étudiants spécialistes ou non en Arts Plastiques doivent apparier librement 3 types de formes (cercle, triangle, carré)et 8 couleurs (3primaires, 3secondaires , noir et blanc), ce qui consiste à choisir la couleur semblant convenir le mieux à la forme. Nous mesurons la fréquence d'utilisation de chaque couleur pour chacune des formes.
RESULTATS : Les sujets, spécialistes ou non des Arts Plastiques ne font apparaitre aucune relation privilégiée forme/couleur ce qui infirme expérimentalement l'hypothèse de Kandinsky. Cependant les étudiants d'Arts Plastiques choisissent d'utiliser les couleurs conformément à leurs préférences contrairement aux sujets non spécialistes. L'ensemble des résultats permet de conclure que l'hypothèse de Kandinsky repose essentiellement sur les apprentissages spécifiques effectués par les étudiants du Bauhaus. Il est vraisemblable que c'est sa propre sensibilité qu'il projetait dans son enseignement. Les lois de l'esthétique de la couleur qu'il a décrites n'ont donc qu'une portée culturellement spécifiée et non générale comme il le pensait.

COLOUR-DESIGN OF MONUMENT BUILDINGS

DEME PÉTER Budapest

Most of the historic town parts in Hungary is being renewed in the recent decades. The aspect or rather the spectrum of the monument buildings has been marked by the entirety of the successive unique solutions. More or less the same was repeated during the after-war reconstruction. However, circumstances / national property, contemporary renewals, more developed technical background etc. / request and enable now the complex treatment of monument buildings which is especially valid for the design of the colour effect.

Common colour harmony will be effected and applied for design of monument buildings by our colour designers with the application of relations of the colour system COLOROID. Besides, the design has to consider several local circumstances. The role in the townscape, the orientation, the function, the historic basis, the index of the environment pollution etc. are the most important factors.

In the basis of practical experience I should like to explain how to ask and to take into consideration the opinion of "the man in the street" and what are the fundamental troubles making difficile the hole realization of the ideas.

Regione Umbria-"Piano per l'Arredo Urbano di Piediluco"--"Piano per l'Arredo Urbano di Orvieto".

Architetti: Alberto Durante, Igino Pineschi, Stefano Garano -Roma-

In the framework of various initiatives to retrieve the old historic town centres the Regional Governement of Umbria has promoted a series of studies on town improvements and embellishments with special reference to the use of color, paving and the arrengement of green areas.
Among various centres taken into consideration the choice fell on PIediluco, a division of the borough of Terni, and on Orvieto. These two centres present conspicious differences as regards size and historic and enviromental characteristics. Keeping these differences in mind we adopted two complementary methods of procedure.
Piediluco is a small "borgo" (700 inhabitants) built on a medieval town plan on the banks of Lake Piediluco and composed mainly of small building but possessing some outstanding environmental qualities. It has been studied and replanned having to these particular characteristics and in order to demonstrate the possibility of restoring its historic image.
Orvieto is a medium size historic town (10.000 inhabitants) with a semewhat complex urban web and possessing several major structures both functional and monumental. In this case the research aimed to produce specific norms and regulations touching types of paving, colour, street lighting and the introduction of elements of embellishment.
The experimental project was carried out on parts of the urban network which we considered particulary significant

Poster Presentation: Application of the Color Image Scale in Japan

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We would like to present posters and other materials, showing the following contents:

1) Developing process of the Color Image Scale in the past 15 years. (Flow Chart)
2) Applied examples of the Color Image Scale, practically used in manufacturing enterprises such as Electric Appliances, Advertising, Housing, Fashion etc. (Photo or slide)
3) Information of "Image Analysis". (Publications)

TYPOLOGIE DES ENSEMBLES COLORES

Michel ALBERT-VANEL PARIS

Il s'agit d'inviter l'auditeur à entreprendre un voyage au sein des ensembles de couleurs et d'examiner leurs caractéristiques propres, leurs filiations, leurs différences.
Cette exploration doit déboucher sur une cartographie, ou encore système de classification, de plus en plus nécessaire pour les musées ou les répertoires de logos ou de sigles.
Une meilleure connaissance des oppositions principales dans les compositions colorées peut également s'avérer très fructueuse dans des domaines comme celui du textile, où il est nécessaire de visualiser rapidement les principales variantes colorées d'une même forme graphique.
Dans l'enseignement, où l'on décèle un abandon progressif des représentations traditionnelles, la notion d'ensembles colorés apporte une réponse plus satisfaisante, car plus proche de la réalité perceptive et plus créative.

L'espace des ensembles colorés se présente comme un hyper-espace, ou nuée informelle, composé d'une multitude de paramètres, dont on ne tirera que les informations utiles.
Il en résulte que l'on peut aboutir à une multitude de représentations issues de la même matrice, dont les systèmes classiques: Chevreul, Munsell, Ostwald, etc... ne sont que des cas particuliers.

Mais nous pouvons établir une hiérarchie de ces paramètres, allant des différences les plus grandes, aux nuancements les plus ténus.
Cette conférence propose donc une exploration de ce nouvel espace des couleurs, plus complexe, mais également plus riche.

NCS, MUNSELL AND DIN ACHROMATIC SCALES -a study of uniformity-

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Much discussion time use to be spent for the penetration of the question how a "correct" equidistant achromatic scale should appear, how it should be related to the stimulus scale and under which conditions it will be relevant.

In order to study the uniformity of the achromatic scales of NCS,Munsell and DIN a pairwise comparison experiment was designed with twelwe PAIRS of colour-samples in a range from white to black. The differences varied between 4.6- 10.6 in NCS blackness s(.36-1.12 in Munsell and .31-1.06 in DIN). The experiment contained 3Ax3B comparative situations: A1. Samples separated 5 mm; judgment of difference A2. Samples close to each other; judgement of difference A3. Samples close to each other; judgement of distinctness of border. B.For each case the PAIRS wer presented on three different backgrounds: I. White II. Gray III. Black The differences between the PAIRS were scaled according to Thurstone's Law of comparative judgements, case V.

The nine scales will be correlated in order to see if there is a significant differens between them. The scales will also be correlated with the NCS, Munsell and DIN scales. All scales will be normalized to the same range from the whitest to the darkest to see in which cases they represent the same lightness space.

Also will be discussed how the "first" scale value could be determined.

A COLOUR ORDINANCE ADAPTED TO THE ARTISTS NECESSITIES
(MAP "K")

FERNANDO PEZZI PEÑALVER

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(ESPAÑA)

The actual ordonnances are orientanted to the industry, but they are not useful to the artists.

That's why, we offer a new colour ordonnance that can be very useful to the artists, mainly in the following aspects:

1- Panoramic vision of all colours in only one plane.

2- A logic ordonnance, simple and clear, of all colours.

3- An efficient instrument to analyze the colours from the model and the creation.

4- A larger facility for the identification colours that industry manufactures.

5- A clear orientation about colours mixture.

6- An important help for the selection of harmonical colours.

We present this ordonnance in a colours map (map "K"). We will explain the way to do it.

Any one who likes can make by himself this map.

NCS used in practical colour design

Åke Svedmyr Stockholm

As long as we can look back in history there has been curious scientists, artists and philosophers who have studied colour appearance. But not until our century, colour order systems has come into common use as a tool for colour communication. In the design - production - marketing process today one needs a colour order system for unambiguous colour descriptions. To suit all parts in the process the system must be based on colour appearance, and it must be illustrated by a large amount of systematically selected colour cards.

The natural colour system NCS is such a system. It is illustrated in a colour atlas with 1412 systematically spaced colour samples. These colour samples are also available in bigger sizes in complete collections and as single cards. NCS is national standard in Sweden and Norway.

Architects and designers use the NCS colour samples for analysing existing colours, making sketches, illustrations for the orderer and specifications for the producers. Due to reasonable prices and quick deliveries the NCS colour samples has become an every day working tool for almost all Swedish architects and designers. But NCS is not only colour samples. It is also a logical structure where one can put in ones aestetical, traditional and technical experiences and get more solid knowledge in the difficult and confusing world of colour appearance.

Mapping of colour names; Comparison of English and Swedish data

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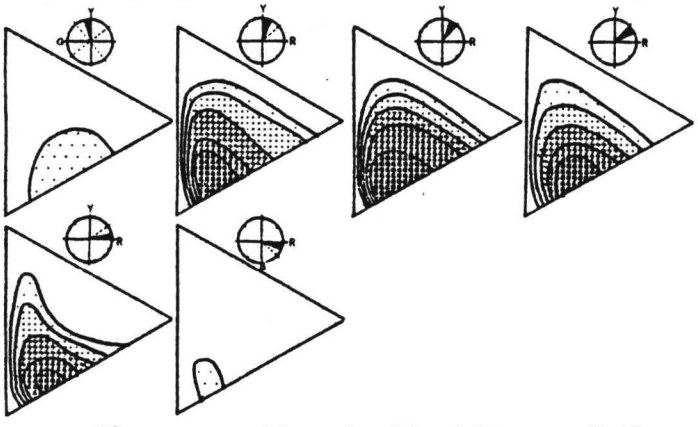
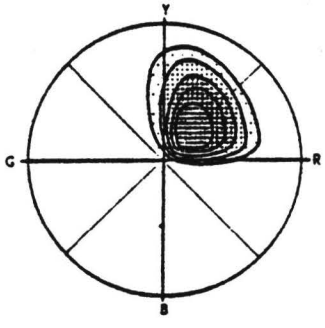
In order to relate the Swedish Standard for color notation, the NCS-system, to common color names a study was performed in which subjects had to estimate how well colour samples were described by 17 of the most usual colour names. The means of the judgements were inscribed in projections of the NCS colour space so that "maps" could be drawn which indicate how the various names have their distribution (like bubbles) in the color space. The study was performed first in Sweden with heterogeneously sampled subjects and then in England with a group of architectural students.

Below is given an example of how the results were mapped out in two projections of the NCS colour space. (BRUN=brown).





The semantic implications of the method and the way of putting the question is discussed as well as a short review of the etymological development of some common European colour words.

DE LANGE'S CURVE AND COLOUR

J. Pérez-Carpinell, V. Climent and M. Aguilar

Depto. Optica. Fac. C. Físicas. Univ. Valencia. ESPAÑA.

The sensitivity curve of the eye to flickering (De Lange's curve) is determined for two observers by using seven different chromaticities besides white. Measurements are carried out with illumination levels of 1030 and 103 trolands, 1º test field (in absence of surround) and monocular and foveal vision.

The aim of this work is to find the way in which the test chromaticity affects the different zones of the sensitivity curve.

In general our results indicate that the eye sensitivity to flickering is smaller for the case of wavelengths next to 680 nm; this difference with the rest of chromaticities is less noticeable when illumination diminishes. It is also observed that independently of the test colour a maximum appears in these curves which is placed around 7 Hz for the 1030 trolands illumination and close to 5 Hz for 103 trolands. Besides this, from the relation between the slope of the lineal part of the curve and the wavelength, it is deduced that for the highest illumination the maximum value of the slope is found in the yellow, is intermediate for green and blue and is a minimum for the red. With the lowest illumination the differences between slopes are less noticeable.

JEUDI 20 JUIN
THURSDAY, JUNE 20
Matin et après-midi
Morning and afternoon

COMMUNICATIONS ORALES
ORAL COMMUNICATIONS

AUDITORIUM
SALLE B
SALLE C
ROOM B
ROOM C

IMPORTANCE ET PROBLEME DU BRILLANT: EVALUATION, MESURE

Robert SEVE, Paris

On dit souvent que le brillant est la quatrième dimension de la couleur. C'est affirmer ainsi que notre perception des phénomènes de réflexion spéculaire est essentielle à l'interprétation de l'apparence du monde visuel. Le sujet a passionné des chercheurs dans des horizons très divers. Cependant bien du travail est encore à faire.

Diverses directions d'intérêt seront d'abord évoquées, introduction à des recherches récentes sur des aspects psychophysiques de l'évaluation du brillant (O'DONNELL, BILLMEYER 1984). La situation vécue comme anarchique, des normes de mesure du brillant conduit à s'interroger sur ce que nous apporte la physique. Une synthèse peut maintenant être faite entre la théorie des facettes développée d'abord par BARKAS (1939), et une approche d'optique physique ouverte par la condition de réflexion spéculaire de RAYLEIGH (1896). La sanction expérimentale garantit une certaine sécurité pour développer des règles relatives aux conditions photométriques de mesure.

Cette voie de progrès souligne la difficulté beaucoup plus ardue d'un vocabulaire satisfaisant, problème qui ne requiert pas qu'une approche technique.

A condition de limiter d'abord un domaine central d'intérêt, plus urgent, certaines décisions peuvent être proposées pour progresser.

Outdoor environments and public lighting : visual and colorimetric aspects.

L. Di Fraia - Electrical Dept. of the University of Naples.

L. R. Ronchi - National Institute of Optics,Florence.

The AIC Colour Dynamics Study Group has recently called the attention of town planners towards the possibility of using coloured materials for the façades, thus abandoning the whitish or grey concrete-like aspect. This enhances the problem, often overlooked,of providing an acceptable visual fruition of exterior environments even during night-time, that is under artificial lighting conditions in areas where mesopic to low photopic levels exist.
However, before dealing with this problem, it is necessary to inquire whether the"quantity"of illumination is high enough to allow the effects of the"quality" to be explored. Therefore, some observers (aged 25 to 40) with normal photopic colour discrimination were tested by means of Ishihara plates and City University tests under various types of outdoor lighting installations. Since it resulted that their colour discrimination was preserved, it may be worthwhile to undertake a wide research program aimed at investigating the influence of different light spectra on the colour aspects of the façades and, on the basis of these data,at finding how surface materials and lighting systems should be coordinated within an "a priori" overall unified approach.
As a first stage, the changes occurring in the colours of samples (cardboards and chalk surfaces),tinted with paints currently used for façades,when passing from daylight to some artificial light sources (high pressure sodium, high pressure mercury and some types of fluorescent lamps) were measured under laboratory photopic conditions by using a photoelectric colorimeter. Significant shifts in crhomaticity coordinates were recorded.

THE PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF GOOD AND BAD COLOR SCHEMES UPON INDIVIDUALS

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Interior designers specify, select and choose colors for interior environments to a greater degree than any other professional person. As color is known to exert psychological and physiological effects on people, the interior designer must be made aware of and accept responsibility for the effects of the colors he or she selects for the interior environments.

Max Luscher's studies established color has an effect upon both central and secondary nervous systems (the latter consisting of the sympathetic and parasympathetic nervous systems). Physiologically, the central nervous system is responsible for conscious actions/reactions, the secondary nervous system controlling the unconscious, or autonomic body functions such as heart beat, pulse rate, and breathing.

We will be reporting the results of our research experiments conducted within two especially constructed spaces in which typical commercial office conditions are reproduced. In each small office, an equal number of male and female subjects of two distributed age groups (18-40; 40-60) will undertake a psychologically designed written test within a designated time period. These tests are arranged to evaluate the subjects' psychological and physiological responses whilst performing the tests within carefully structured interior environments.

The results should enable interior designers to understand how their choice of color schemes for interior environments has a direct mental and physical effect upon the occupants of that environment.

DAS FARBIGE KRANKENHAUS
Zur Farbleitplanung im Klinikum München-Großhadern

Prof. Edgar K n o o p München / BRD

Kernpunkt des Referats ist die entscheidende Verbesserung des "Raumklimas" in den verschiedenen Funktionsbereichen eines Großklinikums durch eine gezielte Farbleitplanung. Anhand von Diapositiven und Großfotos wird deutlich, wie trotz hoch qualitativer, technischer Einrichtungen der wesentliche Faktor "Farbigkeit" in einem Krankenhaus vernachlässigt wurde, und so das Klinikum funktionsgestört blieb.
Was war zu tun?

Interior Element Colour preference Under the Control of Conditions

Motoko Hihara, Tsukuba, Japan

Several studies on the colour preference of the Japanese people have so far been made. Of these studies, Japan Colour Institute (JCI) conducted a research with respect to the colours of interior elements such as curtain, carpet and sofa.

In the present study, an experiment was carried out in which colour objects were presented to subjects in two manners: by a colour simulator and by a colour chart (conceptual colour), and subjects sampled from non-professionals in the interior designing field chose thier preferring colours to determine the colour order of the interior element colours. The experiment reveals that no significant difference exists in the colour preference due to the difference of the colour object presentation manners.

Further, a research was conducted for professionals of interior designing in a similar manner to that employed by JCI, and the obtained data were compared with the data provided by JCI. This comparison shows that colour preference differs between the professionals and non-professionals throughout every interior element colours with respect to the hue and the tone of the colours. It is also found that the professionals are devided into two attributive groups which have strong correlation with the tone of colour.

VARIATION OF COLOUR RENDERING INDEX USING DIFFERENT REAL SAMPLES

Dr. J. Schanda
Research Institute for Technical Physics
of the Hungarian Academy of Sciences

For colour rendering calculations the spectral reflectance characteristics of Munsell sample have been specified. Many of these samples are not available with the original reflectance curves. On the other hand a number of other institutions developed metameric or quasi-metameric samples to above Munsell ones which could be used in colour rendering index calculations.

Present paper investigates how large the to be expected difference will be if instead of the original Munsell samples other samples are used. To perform the calculations modifications to the original CIE procedure have been made using more up-to-date chromatic adaptation transformation, CIELAB colour space and only three basic reference illuminants corresponding to incandescer light, medium and cool colour temperature natural light.

APPROCHE PARAMETRIQUE DU RENDU DES COULEURS

EMBRECHTS Jean-Jacques LIEGE

Une ambiance lumineuse dans un local est souvent composée de plusieurs rayonnements, c'est-à-dire, outre les sources artificielles, la contribution des parois et de l'éclairage naturel. L'indice de rendu des couleurs [1] de la source elle-même s'en trouve plus ou moins modifié.
Afin d'étudier quantitativement et, surtout, qualitativement cet effet, un spectre quelconque peut être caractérisé par 3 paramètres : By, Gy et Ry, respectivement "la proportion de bleu, vert ou rouge par rapport au jaune" qu'il contient [2]. L'indice paramétrique de rendu des couleurs Râ(By, Gy, Ry) a été défini de telle manière qu'il soit très proche de l'indice général de la CIE. L'écart entre les deux est d'ailleurs inférieur à 5 unités dans la majorité des cas étudiés (plus de 1000 spectres lumineux représentatifs).
On a déterminé en outre la représentation graphique Râ(By, Gy, Ry), ce qui permet de constater l'influence de chaque paramètre sur le rendu des couleurs.
La relation entre les paramètres pour deux rayonnements composés étant de type linéaire, la représentation de la combinaison de deux sources est aisée et parlante. Il en est de même de l'étude des composants et de la pondération du mélange en vue d'obtenir un Râ donné et, en particulier, de l'étude de la contribution des réflexions et de l'éclairage naturel.

Réf. [1] Publication CIE N° 13.2 (TC-3.2) (1974)
[2] EMBRECHTS J.J. : "Colour rendering and spectral power distribution - a new parametric approach" Ltg. Res. & Technology, 16, (3), 119 (1984).

LA COULEUR DANS L'ENVIRONNEMENT DU TRAVAIL.

En 1945 aprés la libération de la France les usines étaient grises.

Elève de FERDINAND LEGER, j'ai commencé a mettre en couleurs les lieux de travail et à créer des gammes de couleurs pour le bâtiment.

Depuis 40 ans j'ai réalisé plus de 200 usines et bureaux en couleurs en Europe. Dans cette pratique j'ai étudié le comportement social du travail sous l'influence de la couleur.
Tout en tenant compte des couleurs fonctionnelles et des couleurs de sécurité, j'ai recherché la dimension esthétique de la couleur dans l'environnement.-

Mon exposé sociologique se ferait sur la présentations de divérs diapositives qui illustrent mes réalisations. -

Georges PATRIX - coloriste conseil -
Enseignant à l'Université Paris 1 Sorbonne.

THE COLOUR IN THE WORK-SURROUNDINGS.

Since the war, in 1945, I have been working with the use of colours at the place of work. I have studied the social behavior of people according to the different colour schemes.
While I'm projecting the slides of my realizations I'll relate different experiences.

Television Illumination Consistency Index: Analysis of Results of First Field Trial

W.N. Sproson Stamford, England

New high efficiency lamps which are potentially useful for television need to be assessed for their colorimetric properties. Their suitability may be assessed by the television illumination consistency index which compares colorimetric performance in a TV system, of a test lamp & a reference (P3000K or D_{65}). Theoretical work using a computer model has indicated that this proposed index could be a reliable guide to practical performance. The results of the first field trial (which used 37 observers, 8 test lamps and a tungsten reference) are examined for split-screen & alternate presentation of pairs of pictures. Statistical analysis shows high correlation between subjective judgements of the pairs & various parameters derived from consistency indices (e.g. mean value for a set of test colours, mean value for flesh tones, lowest index) particularly for split-screen viewing. Multilinear regression has given correlation coefficients as high as 0.98. It is also true that the General Colour Rendering Index, R_a, gives good correlation for a single parameter so that careful consideration will need to be given on the merits of any new index, when an existing index R_a would seem to perform satisfactorally.

Artificial sources representative of CIE standard illumination D65

Yue-xin Shu

Special made high pressure short-arc xenon lamps (200W) with stabilizer are stable over 300hours of operation with regard to their radiant powor outptut both in level and in spectral distribution.

Such sources incorporate "spectrum modulators" consisting of suitable filters: one filter suppresses the long wavelength region beyond 580 nm and remains all short wavelength range from 300-400nm, another suppresses the strong emission of irradiance in the xenon sources around $\lambda \simeq 470$nm, and the spectral transmittance characteristics of the third filter modifies the whole spectral distribution exact to the CIE D65.

The agreement between the spectral distribution of our artificial source and CIE D65 appears quite good throughout the spectral range from 300-780 nm. Their color rendering indexes (CRI) can reach or be greater than 99. Their visible range metamerism (MI_{vis}) and ultraviolet range metamerism (MI_{uv}) are both smaller than 0.25 (CIELAB). Atthe present time, daylight simulators of category BC(CIELAB) are found to be useful for many applications.

The filtered tungsten-halogen lamps can be done econc mically to realize the CIE D65, which incorporate merely a layer of thin colored glasses whose area and thickness are computed by a method based on an optimization algori thm. Their CRI are greater than 96 and MI_{vis} are smaller than 0.6(CIELAB). The difficulty are in the short wavelength range from 300-380nm. These filtered tungsten-halogen lamps are available commercially from our laboratory.

LIGHT AS IN FLUENCE ON THE COMPREHENSION OF COLOR

by Alexander F. Styne

Color is the result of visible radiation, modified by filters into partially transmitted light or modified by partial reflection from objects.
What our brain makes of these stimuli does not always follow our expectations, due to the characteristics of the light emitted from the source.
The variety of light sources with which we are confronted every day makes it necessary to evaluate our responses to visual stimuli.
Relatively unexplored is the phenomenon of the increased color gamut that is triggered by radiation from three-component lamps.
An attempt is made here to give some examples offering evidences of these phenomena.

L'INFLUENCE DE LA LUMIÈRE SUR LA COMPRÉHENSION DES COULEURS

Les couleurs resultent de radiation visible, modifiée par des filtres ou de la réflexion partielle d'objèts. On va essayer ici à donner preuve que la varieté des rayonements émise des illuminants existants et utilisés partout, nous éxige à évaluer de nouveau nos reponses sensibles.

DER EINFLUSS DES LICHTES AUF DAS VERSTEHEN DER FARBEN

Farben sind das Resultat von Stimuli, erzeugt von sehbarer Strahlung durch Filtern oder von unvollständiger Reflexion durch teilweise Absorption von einem Gegenstand. Man versucht hier zu zeigen dass unterschiedliche Kompositionen von spektraler Strahlung in den vielen Lichtquellen die heute zur Verfügung stehen, eine neue Bewertung der Gefühlsreactionen notwendig geworden ist.

HETEROCHROMATIC BRIGHTNESS MATCH IN PERIPHERAL VISION

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The problem: a raster, where red and green LEDs are intermingled, (inter-centre distance 40', diagonal, 4°) is presented at various eccentricities, along different meridians. . Everywhere, the LEDs appear as spatially discrete. The question is set whether the above target should be considered as large or small.
Response index: heterochromatic brightness match. Raster data are compared to data obtained by the use of a pair of (red and green) LEDs
Method: a red pulse (800 ms) of variable luminance is followed by a green pulse (800 ms), the (photopic) luminance of which, E_g, is 5 cd per sq.m throughout the whole experiment. The outcome (constant stimulus method, Probit Analysis) is the red (photopic) luminance E_r at the brightness match. The retina is adapted to a white field, 1 cd per sq.m.
Data Presentation: log (E_r/E_g) is displayed versus eccentricity and, at any location, versus the degree of out-of-focus.
Findings: within 30°-40° from the fovea, the responses to the raster differ from those to the single pair of LEDs. Hence, the raster is to be considered as a large target (although its elements are spatially resolved). However, the raster response is sensitive to changes in image size due to blur. Hence it is not "large" under all respects
Theoretical implications: relative weights of the contribution to brightness of rods (achromatic channel) and extra-signal (color-opponent channel), the former mainly concerning green response, the latter the red response, and the differential dependencies of either contribution on stimulus size.

Cone interrelations in color-matches

Françoise VIENOT, PARIS, FRANCE

A comprehensive way of studying color-matching is by evaluating cone excitations, as proposed in an alternative system of colorimetry by Boynton (CIE, 20th session, 1983). The three cone excitations have been computed for repeated color-matches, in order to study the behaviour of each receptor type, and the variability of the cone responses.

It is possible to show some relationship (opponency or synergism) between cone types.

At a few wavelengths, the influence of parameters such as eccentricity, duration of observation, luminence levels, on the nature and on the strength of the interrelations between cones has been studied.

A visual model for brightness perception at mesopic levels.

Y. Nakano and M. Ikeda

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It is important to investigate the interaction between rods and cones to specify colored lights about their brightness at mesopic levels. Two monochromatic lights λ_1 and λ_2 were mixed in various radiance ratios and their additivity was measured by matching the mixture and a white reference light in their brightness with a 10° bipartite field. The wavelengths combination of 490 and 610 nm and the reference light level of 1 troland were, for example, chosen so that the stimuli mainly stimulated rods and cones respectively. A clear supra-additivity was found under these conditions. That is, less radiances were needed to match the reference light than expected from the linear summation between rod and cone.

This non-linear behavior of additivity was explained by a model in which the rod and cone responses sum up after the logarithmic transformation. It was also concluded that the weights of rod and cone responses at the summation were solely determined by the cone responses.

Color appearance in the low illuminance

Keishiro Takeichi
Hisao Miyano
Ken Sagawa

It is well known that color appearance is largely affected by illuminance, specially in the mesopic range. But the concrete change of color appearance is not so well-known. The purpose of this study is to examine the change of color appearance by the use of the multidimensional scaling. 18 Munsell colors are used which varied in value, hue and chroma. 18 colors as the standard are pasted on the left end of the grey board. Subject is required to move, one by one, each of the other 18 colors to the right according to the difference he observed between each two pair colors. Illuminance levels by the white fluorescent lamp are 100 lux and 0.1 lux. Data analysis was carried out by the non-metric multidimensional scaling for the directional ranking data. The result of the experiment under 100 lux showed that the obtained color circle was almost corresponded to the arrangement of the Munsell color system. But in the result of the 0.1 lux experiment the reduction was seen in the first axis which was seemed to be the yellow-purple axis. And also the Purkinje shift was confirmed.

The perception of moving comets: a computational approach to rod-cone interaction effects at high retinal illuminance levels.

John L. Barbur, The City University, Applied Vision Research Laboratory, Northampton Square, London. EC1V OHB.

Recent current flow measurements in isolated, rod outer-segments show that the signals generated in response to brief flashes of light saturate in amptitude and become progressively longer at higher stimulus intensities [1]. In spite of these and other measurements which reveal extremely long delay-times for rod signals at high levels of stimulation [2], most psychophysical tests of visual performance carried out at comparable levels yield good temporal responses. An exception to this rule is the comet-like appearance of a small target when presented moving with a speed as low as 0.3°/s outside the foveal region of the retina.

Data on the parametric properties of the comet-effect will be presented and the results will be explained by means of a model of rod-cone interaction at high retinal illuminance levels which takes into account the different temporal properties of rod and cone receptors. A computational approach which was used to implement the model and to predict the appearance of the moving target under different conditions yields results which are very similar to those observed experimentally.

1. B.J. Nunn and D.A. Baylor, Nature, 299 726-728 (1982)

2. R.D. Penn and W.A. Hagins, Biophysical Journal, 12 1073-1094 (1972).

INTERACTION OF CONES AND RODS IN DETERMINATION OF THE COLOR HUES AND THE OPPONENT COLOR INDUCTION

Zsolt TÁNCZOS

Institute of Psychology, Hungarian Academy of Sciences, Budapest, Hungary

The indirect scotopic influence of the background on the blue mechanism at moderate intensity level was discussed. (U. and B.Stabell demonstrated in detail the hue modification effect of the scotopic activity.) We calculated those wavelength displacements which correspond to the scotopic sensitivity changes in relation to the photopic one, but expressed the scotopic sensitivity by division of 7.5 to reflect its efficiency in terms of receptive field, according to Willmer's procedure. (Correction of similar order has been applied by Bouman and Walraven for the "scotopic cone" cone vision. The role of the cone plateau in the cone-rod interaction is indicated from more aspects.) We obtained zero wavelength shift at the invariant blue (475 nm). The invariant green is very near the maximum of the scotopic sensitivity, while the invariant yellow approximates the photopic maximum. The invariant red at 650 nm on moderate intensity level might occasionally be correlated with the fact that beyond this value on the long wavelength part rods are ruled out from the excitation. The opponent color pairs were derived from the hue shifts of the Bezold-Brücke effect in relation to the invariant loci. The formations of color hues and opponent color induction might be regarded as relations of the local excitations to the sensitivity maxima in different dimensions or such variations of the lateral inhibition in connection with the photopic-scotopic sensitivity changes which cannot be transformed in figural processes.

SPATIAL AND TEMPORAL FACTORS IN THE DIAGONOSIS OF COLOR DEFICIENCY

ALLEN L. NAGY
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Tests for diagnosing color deficiency typically require the discrimination of colors in small stimulus fields viewed continuously. For example, Rayleigh color matches are usually made between a mixture of two primaries presented in one half of a small stimulus field and a test light presented in the other half. Both the range of mixtures acceptable as a color match and the midpoint of this range are important for diagnosis. The range gives a measure of the ability to discriminate color. I have found that the size of this range depends on field size or viewing procedure for some color deficients but not others. For some the range is much smaller with large stimulus fields but whether the stimulus fields are viewed continuously or as alternating flashes has little effect. For others field size has little effect but the range is much smaller with alternating flashed stimulus fields. For still other color deficients neither variable has much effect. These results suggest that there are large individual differences in the spatial and temporal properties of color coding mechanisms in color deficients. Thus a single test procedure may not be very diagnostic of an observers ability to discriminate colors under other viewing situations.

Optimal colours, metamerism and colour constancy

J.J. Opstelten, Eindhoven

Metamerism is one of the basic problems in the selection of test colours for the specification of the colour-rendering properties of light sources. To get a better understanding of this problem different types of theoretical test colours were investigated which are metameric under daylight D_{65}. The first one consists of test colours with spectral reflectances which are either zero or unity and which chow four transitions between these two values. The metameric mismatch under standard light source A will be given for this type. The second type consists of test colours with two reflectance values. Colour constancy is assumes for the test colours with the smallest difference between the two reflectance values. The third type consists of test colours with reflectance values which are either zero or unity and with six transitions between these values, and which show colour constancy in the former sense. The investigation was carried out for greys with different luminous factors Y, for the eight CIE test colours and fore more saturated chromaticities with a luminous factor $Y = 0.30$.

THE CHARACTER OF METAMERIC-BLACK CURVE AS THE DETERMINANT OF RATIO OF OBSERVER- TO ILLUMINANT- DEGREE OF METAMERISM

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The reflectance difference of a metameric pair, plotted as a function of wavelength, has been defined (1) as the metameric black. We may define a "simple metamer" as one characterized by three null-points, and with no more than one maximum or minimum in each of the four lobes of the metameric black curve. All other metamers are defined as "complex metamers". For a simple metamer, viewed in a blackbody or near-blackbody source,there is a simple relation between the source temperature and degree of metamerism. Moreover, for such a metameric pair the color difference seen by different observers, for instance, the 2-degree and 10-degree observers, or the standard-deviate observer, is predictable in relation to the black-body effect, and is substantially smaller than the Illuminant D65 to Illuminaant A metamerism. As the metameric-black curve develops increasing complexity, the magnitude of the observer degree-of-metamerism increases, relative to the D65 - A metamerism,and its direction in color space no longer bears any simple relation to that perceived with change of temperature of the illuminant.

(1).G. Wyszecki and W. S. Stiles, COLOR SCIENCE, page 187, 2nd edition, John Wiley NY 1982

28 Sept. 1984

The Most Significant Metameric Black Determined by Daylight Phases.

Michael H. Brill, Science Applications International Corporation, 1710 Goodridge Dr., McLean, VA 22102 USA.

The statistically most significant metameric black among empirical daylight spectral power distributions was determined from the data of Judd, et. al. [D. B. Judd, D. L. MacAdam, and G. Wyszecki, J. Opt. Soc. Am. 54 (1964), 1031-1040]. This spectrum is (up to a factor) the single linear combination $S_4(\lambda)$ of the mean daylight and the first three characteristic vectors (V_1, V_2, V_3) that is orthogonal to all the C.I.E. tristimulus functions $\bar{x}(\lambda)$, $\bar{y}(\lambda)$, $\bar{z}(\lambda)$. (Any metameric blacks independent of $S_4(\lambda)$ must be derived using V_n, $n > 3$, which are statistically less significant than V_1, V_2, V_3.) The spectrum $S_4(\lambda)$, determined by standard methods, has zero-crossings near 450 nm, 540 nm, and 610 nm. This observation provides a statistical basis for W. Thornton's observation [J. Ill. Eng. Soc. (1979), 78-85] that metameric spectral power distributions tend to cross each other at these special wavelengths. Other features of $S_4(\lambda)$ are also discussed, especially the behavior near 560 nm (at which all the spectral power distributions of daylights were normalized to 1000 by Judd, et. al. before computation of the covariance matrix whose characteristic vectors are the daylight phases).

Intersections of Spectral Reflectance Curves of Metameric Colors

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Spectral reflectance curves of two object colors that are metameric under a given condition intersect at least at three wavelengths within the visible spectral range. Though it is proved theoretically that the minimum number of intersections is always three, the locations of intersections are not prescribed theoretically and are still open to question.

Thornton, for example, claimed from the numerical experiments that the three intersections are pinpointed at wavelengths 448±4nm, 537±3nm, and 612±8nm. Ohta and Wyszecki however pointed out that the locations of the intersections are strongly dependent on the methods of generating metamers.

In an attemp to settle the problem, I have further studied, by use of a linear programming technique, the ranges of wavelengths of the intersections. The results show as expected that three wavelengths L1,L2,L3 distribute over rather wide ranges as 430nm≤ L1≤480nm, 500nm≤L2≤580nm, and 550nm≤L3≤640nm. However the results also show that the three wavelengths tend to converge to L1=450nm, L2=540nm, and L3=610nm as the degree of metamerism increases. The relations among L1,L2, and L3 will be discussed in detail.

PSYCHOPHYSICAL EVALUATION OF GLOSS OF PAINTED SAMPLES

D. JUNGMAN and R.D. LOZANO

This study is part of a research in course to find correlations between physical measurements of optical properties of selected materials and psychophysical evaluation of a mode of appearance called gloss, of these materials.
Previous work has been published[1,2] elsewhere. These reports deals with the problem of selection of the psychophysical method and the study of the problem with paper samples.
The present work deals with painted samples of different grades of gloss.
Asummary of the methods choosen for selecting the samples, their main optical objective characteristics and the subjective results obtained for three different observation geometries (45°,60° and 75°) are given. The statistical correlation between the different geometrical conditions for physical measurements are correlated with the psychophysical scale determinated by the subjective experiment.

References

1 "La evaluación psicofísica de brillo - I:Prueba y elección del método", D.Jungman y R.D.Lozano, Opt. Pura y App.
2 "La evaluación psicofísica de brillo - II: Muestras de papel", D.Jungman y R.D.Lozano, Opt.Pura y App.

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Einfluß von Leuchtdichtestrukturen auf den binokularen Glanz

Wolf Czepluch Berlin

Die gegenwärtigen Verfahren zur Kennzeichnung der visuellen Glanzempfindung bewerten zwar integral oder differentiell bestimmte Teile der Leuchtdichteindikatrix, passen sich aber nicht den unterschiedlichen Bedingungen bei monokularer und binokularer Glanzbeurteilung an. Da einerseits Experimente ergeben haben, daß die bevorzugte Akkommodationsentfernung für monokulare und binokulare Beobachtung unterschiedlich sein kann, und da andererseits die gesehene und damit wirksame Form der Leuchtdichteindikatrix von der Akkommodationsentfernung abhängt, liegt hier eine Quelle für Unsicherheiten in der Glanzbewertung. Mit einem mathematischen Modell läßt sich die bevorzugte Akkommodation beim binokularen Sehen unter Berücksichtigung der Oberflächenstruktur aus der Korrelation beider monokular gesehenen Leuchtdichteverteilungen herleiten und in Beziehung zur Disparation setzen. Zusätzlich rufen die variablen Abstände zwischen Beobachter, Probe und Lichtquelle eine weitere Verzerrung der gesehenen Indikatrix hervor, so daß je eine Standardabmusterungsbedingung im Nahbereich und im Fernbereich empfohlen wird. Paarvergleichs-Experimente im Nahbereich an realen Proben zeigen, daß sich die Glanzunterschiede zwischen monokularer und binokularer Beobachtung bzw. bei Beobachtung mit unterschiedlicher Disparation durch den 20°-Reflektometerwert nach DIN 67 530 bzw. ISO 2813 ausdrücken lassen.

Written by : Dr FRANZ E. MERCK D 6100 DARMSTADT

TITLE : HIGH LUSTER MICA PIGMENTS FOR AUTOMOTIVE COATING.

By coating mica with metal oxides which have a high refractive index (Ti 02, Fe 2 03), one obtains transparent pigments of platelets form with high lustre and radiant colors. The characteristics of these pigments when employed in paints, especially in car paints, are discussed using examples.

Die Beschichtung von Glimmer mit Metalloxiden (Ti 02, Fe2 03), die einen hohen Brechungsindex haben, führt zu transparenten, plättchenförmigen Pigmenten von hohem Glanz und leuchtenden Farben. Die Eigenschaften solcher Pigmente in Lacken, speziell Autoserienlacken, werden anhand von Beispielen diskutiert.

Author: Dr. Gerhard Rösler

Company: Johne + Reilhofer KG
Fraunhoferstr. 14
8033 Martinsried

Title: (German)
"Farbmetrische Charakterisierung von anisotrop streuenden Proben, z.B. Metalleffektlacken oder genarbten Kunststoffen"

(English)
"Colorimetric characterization of nonisotropic diffusing samples, e.g. metallic paints or textured plastics."

Abstract: (German)
Ein einfaches und schnelles Spektralmeßverfahren zur farbmetrischen Charakterisierung und zum Vergleich von z.B. Metalleffektlacken und anderen strukturierten Proben wird hergeleitet. Ausgehend von der international genormten 45 °/°Meßgeometrie werden zusätzliche gerichtete Meßgeometrien vorgeschlagen und anhand von Meßergebnissen diskutiert.

(English)
Derivation of a fast spectral measuring process for colorimetric characterization of e.g. metal effect paints and other structured samples. Starting from the internationally standardized 45°/0° measuring geometry additional geometries are discussed on the basis of measurement results.

GEOMETRIC CONSIDERATIONS AND THE APPLICATIONS OF APPEARANCE ANALYSIS

BY

RICHARD W. HAROLD

HUNTER ASSOCIATES LABORATORY, INC.

RESTON, VIRGINIA, USA

ABSTRACT

Optical measurements for the appearance characteristics of objects can vary with the optical properties of the objects, the visual observing situation, and the intended usage of the data collected. The understanding and recognition of the relationship between appearance and specific optical phenomena is very important in choosing the proper configuration of an appearance measuring instrument. Without this understanding, the quantification of appearance becomes extremely difficult.

The basics of light interacting with objects are discussed along with the perceived appearance characteristics. The chromatic and geometric attributes of object appearance are identified and their inter-relationships discussed. Specific industrial materials will be evaluated and recommendations made for their appearance analysis.

Consumer awareness of appearance is becoming increasingly important in the competitive marketplace. Knowledge of the optical properties of materials and the proper application of appearance measurement technology will allow manufacturers to lower production costs, reduce customer complaints and improve product quality.

JEUDI 20 JUIN
THURSDAY, JUNE 20

COMMUNICATIONS AFFICHEES
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POSTER ROOM

SESSION 3

Studies of Colour Difference

Genro Kawakami, Prof.,Dr.
Tokyo Institute of Polytecnics (Japan)

Using the neighbourhood of the five colours defined by the CIE Guidline for coordinated research on colour-difference evaluation, the perceived colour differences of 90 pairs per one of the five colours are estimated subjectively by means of ratio estimation method under standard illuminant D65, and are compared with their colorimetric ones in the CIE 1976 L*a*b*. The 90 pairs are divided into 3 groups including 30 kinds of hue differences, of value differences and of chroma differences. Also illuminant D65 is realized by a special fluorescent lamp.

As a result, any perceived hue differences of the red group are smaller than ones of the other groups, and any perceived chroma differences of the yellow group are smaller than one of the other group.

Exposé : M. F. HOFMEISTER

TITRE : EVALUATION COLORIMETRIQUE DES PIGMENTS PERLESCENTS.

Les pigments perlescents sont des pigments interférentiels dont la couleur est créée par interférence de la lumière et non par absorption de celle-ci.

Cela signifie que, contraitement aux pigments ordinaires, les exigences particulières doivent être observées lors de la préparation de l'échantillon et il y a lieu également de sélectionner un mode de mesure optique variable.

L'évaluation colorimétrique est réalisée en utilisant le système CIELAB qui, suivant la formule angulaire, permet d'obtenir des coordonnées trichromatiques variables.

Change in Colour of Dyed Cotton after Finishing with N-methylol Compounds (Poster presentation)

S. Csányi ; Gy. Lepenye; F. Szoróka; A. Vig; L. Goretzky; I. Rusznák

BUDAPEST (Hungary)

Technical University, Budapest

Further colour shift occuring in cotton resin finishing with N-methylol compounds, were investigated. It has been established that change in the K/S concentration relation of dyes and increase change in colour (hue) due to application of complex reactive dye, after finishing. Dye concentration must be higher by about 10 % to arrive at the wanted K/S value after resin finishing. Computerized colour recipes must be rectify before dyeing to arrive at the wanted colour after finishing.

New Measurement System for high-speed tristimulus colormeasurements

Dr.-Ing. Reiner Rattunde
Dipl.-Ing. Frank Rochow

In several applications is a request for fast colormeasurements e.g. light emitted from signal rockets or cartridges with solid fuel, or light emitted during switching on resp. burning in periods of discharge lamps.
A new computer controlled measurement system for these specific purposes has been developed.
It consists of a tristimulus colorimeter head, based on thermostated partial filtered Si-photoelements with a very fine correction of their spectral responsivity of the color matching function in the highest possible accuracy class, integrated fast photocurrent amplifiers, digital converters and display unit with features as autorange, 4 1/4-digit display and IEEE 488 Interface, control computer system with different peripheral devices and measurement and data evaluation software, longtime measurement with selectable measuring rates down to 100 readings/sec. can be carried out.
The sensitivity of the system for standard illuminant A covers the range of 10^{-3} to 5×10^{4} lx.
Several examples of measurement protocols will be shown.

The Calibration References of A Tristimulus Colorimeter for Measuring Daytime Colors of Retroreflective Materials Used as Traffic Signs.

Toshio Yamanaka and Yutaka Kurioka
Electrotechnical Laboratory, Osaka Branch
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In the color measurement of retroreflective materials used as traffic signs, a tristimulus colorimeter might cause a rather large colorimetric error because of their high color saturation, even if its spectral sensitivity deviates slightly from Luther condition. To reduce the error, it is effective to use retroreflective material itself as the color calibration reference.

We have established the daytime color references using six colors samples of retroreflective materials. The samples are enclosed lens type and were illuminated by a carbon arc for aging of ten hours. Trisimulus values of the samples were decided a spectrophotometer under the geometric condition of 45/0.

In next step, six set of calibration references, which were selected from the same lot of retroreflective materials as the color references, have been made comparing with the color references using a tristimulus colorimeter, and will be distributed to one test laboratory and five manufacturing companies in our country. This will contribute to unify colors of traffic signs.

We explain the effectiveness of the calibration references to estimate the colorimetric error of tristmulus colormeters.

De l'inadaptation de l'unité d'écart de teintes HUNTER Lab ou CIE Lab pour le contrôle industriel de la couleur.

Claude KRASETZKI

RIPOLIN-DUCO - STAINS

L'observateur évalue les défauts de teinte en fonction de 3 critères :

- clarté
- nuance
- saturation

Si Δ L donne bien une indication sur le défaut de clarté, Δ a et Δ b ne fournissent pas directement les défauts de nuance et de saturation. Pour avoir accès à ces deux caractéristiques, une interprétation est nécessaire à chaque fois en fonction de la teinte considérée.

De plus, on n'obtient pas assez de précision avec les valeurs numériques Δ a et Δ b quand il s'agit de défauts très fins.

Seules, les valeurs S et T normalisées par DIN et AFNOR permettent la détection précise des défauts et leur correction.

Cependant, au contraire des valeurs Δ a et Δ b, le calcul de S et T est difficile et apparemment non encore disponible sur les systèmes de contrôle colorimétrique informatisé.

Des exemples concrets montrant l'avantage de S et T sur Lab sont donnés.

G. JANIN

Etude de la variabilité de la couleur du bois de chêne de tranchage (QERCUS S.P.) FRA

Résumé non parvenu

Evalution of Color Difference

Hitoshi Komatsubara
Japan Color Research Institute (Tokyo)

This study will present the result of investigating and discussing how perceived color difference(PCD) correlates with colorimetric color difference(CCD) cocerning suface-color in the region of the CIE guideline colors.
For the evaluations of color difference,comparing the reference pair with the test pair,the ratio of PCD was subjectively determined by observers using the ratio estimation technique by S.S.Stevens.
Observers were requested to evaluate the rerative value of PCD,the test pair to the reference pair, and then answered the ratio.
As the results,it was cleared that CCD might not coincide with PCD when weighting to both hue-difference ΔEh and saturation-difference ΔEc did not be considered.
Then,obtaining the weighted coefficients for them, we proposed that calculating the color difference should be done by revising equation as follows ;

$$E' = ((h\Delta Eh)^2 + \Delta Ev^2 + (c\Delta Ec)^2)^{1/2}$$

TEACHING THE C.I.E. SYSTEM OF COLOUR MEASUREMENT

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Students of Physics and Colouration processes find the C.I.E. System of colour measurement one of the most difficult concepts to understand in their whole educational experience. Even experienced technicians in the dyeing industry who apply the system routinely have been found to have serious misconceptions of the underlying theory.

There are two approaches to teaching the C.I.E. System: One is to introduce the idea of trichromatic matching using Red, Green and Blue lights and lead on to X, Y and Z as though they were theoretical stimuli. The other is to discuss human colour vision and then introduce the standard observer function $\bar{x}_\lambda$, $\bar{y}_\lambda$ and $\bar{z}_\lambda$ as though they were cone colour response curves.

The author's experience is that the second method is a far more satisfactory and successful way of introducing the concept. Although requiring a little more mathematical skill, students acquire a far better understanding of the trichromatic values, X, Y and Z, while the LAB System appears as a natural extension paralleling the Hering theory of colour vision. Simple microcomputer programs can be used to aid the learning process.

MY PROGRAMME IN MATTER OF COLOUR EDUCATION FOR TECHNICAL STUDIES ON COLOUR TELEVISION.

Vanna Galassi Principe - L. Rositani Ronchi
I.T.I.S. "Meucci" Firenze

A B S T R A C T

The present poster is suggested by a sort of familiarity with technical teaching (and secondary school text books) concerning electronics, and with the particular chapter tackling a topic as difficult as colorimetry.

We propose a revision of the traditional programme in order to avoid either drastic and erroneus oversimplifications of trichromatic theory and chromaticity diagram, or pseudo-rigorous but unclear explanations.

Our starting point is the question "what is colour", by considering the conflict between the engineering approach and another more realistic based on a statistical treatment of visual data. The above paradigm is to be unified in the presentation of "chromatic information" as a part of the television system.

In particular, the choice of the set of primaries for CTV is inserted in the historical picture of mathematical tranformations culminating in the CIE system. The implications of the differences between the CIE chromaticity diagram and the chrominance-vector's diagram are also evaluated.

Title - ROLE OF COLOUR IN AUDIO-VISUAL EDUCATION

Name of the Author - Ranjan Joshi, Mrs.Shalini Patwardhan, India.

The communication of the human being with the surroundings is through his sense organs. We see size, shape and colour of the things, we feel warmth and cold, we smell odours and taste food. 85% of the knowledge of the world around us is by actual observation i.e. through eyes.

Education is nothing but the communication of the systematic information pertaining to a subject which may be achieved through different media such as books, models, newspapers, magazines, journals, video, T.V., movie, tape-recorder, radio, drama etc. and now through Computers. In all these media 'Colour' plays an important role. Colours have wide ranging psychological and physiological influences on the viewer. Colours not only can project weight, distance, texture and size, but also can symbolize complicated concepts such as danger, caution, cold, hear, purity culture, cleanliness, freshness etc. Colours associated with the object attract the viewer, proper selection of colours establishes the association with the object, colour harmony and contrast accelerate the analysing process in the brain, colour schemes makes the retention and reproduction of the information easy. Colour thus carries a multi-fold coded information and activates the whole process of visual communication. Modern Computer with colour, graphics and audio facilities is a powerful tool in audio-visual education at not only primary, medium and college levels but also for a common man.

COLOR-GAZING 1990 AND BEYOND

SCHIRMEISTER B. USA

Résumé non parvenu
abstract not received

Analysis of Benzoyl Peroxide and Benzoic Acid In Textile Materials by TLC

Theresa A. Perenich and Lisa Moore

University of Georgia, Athens, Georgia

ABSTRACT

Discoloration of textile products, expecially those representing a large investment to the consumer (for example, carpets), has been a problem on which the textile industry has focused its attention. Discoloration problems have accelerated with the widespread use of hundreds of household chemicals. Among those chemicals widely used are cosmetic preparations and acne medications containing benzoyl peroxide. Detrimental effects on textile materials from these products usually result in loss of color either directly or by accelerating fading with light and/or atmospheric contamination. The color change in most cases is irreversible.

Analytical identification techniques have been developed to determine the causative agent involved in some of the discoloration problems. A high performance liquid chromatography (HPLC) technique has been developed to identify the presence of benzoyl peroxide and its reduction product, benzoic acid on textile products. Although the HPLC method is effective, it is a costly procedure and many textile laboratories do not have the equipment needed.

This research focused on developing a simple technique for identifying benzoyl peroxide and benzoic acid using reversed phase thin layer chromatography. The eluent system producing optimal results for benzoic acid and benzoyl peroxide identification was 85/15 acetonitrile/water. Visualization of the spots is with a bromocresol green and Rhodamine G spray reagent.

The advantages of this technique are good low level detection, little space requirements, easy to perform, and decreased development time.

BENEMATE J.J. USA

SPECOLOR, A REFLECTIVE/SPECTRAL COLOR DISPLAY SYSTEM

THE PROBLEM, REFLECTIVE VS SPECTRAL COLOR

There are four major areas that must be addressed if one is to be involved in computer color graphics.

a. Reflective and spectral color being two different technologies, creates a problem in the translation of color graphics to video.

b. Introduction of a human element, the programmer, who makes a value judgement based on personal color preferences is tragic, often using incorrect colors or those that are not compatible.

c. Fault of manufacturers, researchers and educators to collaborate in bridging the gap that exists between reflective and spectral color.

A NEEDS ANALYSIS

Needed is a visual reflective/spectral portable color display system, capable of previewing, matching, comparing, translating, specifying and transmitting color data. The retail cost for color hardware should compare with average software, if one is to reach the masses in color education.

SPECOLOR, A SOLUTION

SPECOLOR is a visual reflective/ spectral color display system. Using the system, you may observe color on a remote video screen, assign an alpha-numeric code to the specific hue and hand carry the unit to other non compatible systems for a synchronous color match. a simple device, SPECOLOR is capable of displaying as few as 72 colors or as many as 62 million, 748 thousand and 517. The subtle tonal values are all within reach and once dialed, can be recalled through an alpha-numeric system. In a single display, you may observe a primary color and a complementary analagous color for comparison. This method for previewing, affords the viewer an instant evaluation of a grouping of color. Dialing a primary and a secondary, displays both colors while illustrating the hue obtained from the mix.

SPECOLOR technology has application in computer color graphics, medicine, on line quality control and color comparison in industry, painting, photography and education.

Mac DOUGALL D.B. - FRANCOMBE M.A. - WHELEHAN D.P.
GBR

VISUAL DESCRIPTIVE PROFILING OF MEAT UNDER DIFFERENT ILLUMINANTS

Résumé non parvenu
abstract not received

VENDREDI 21 JUIN
FRIDAY, JUNE 21
Matin et après-midi
Morning and afternoon

COMMUNICATIONS ORALES
ORAL COMMUNICATIONS

AUDITORIUM
SALLE B
SALLE C
ROOM B
ROOM C

Symbolisme des couleurs et anthropologie culturelle

TORNAY Serge *France*

La notion de symbolisme des couleurs (SC) est d'abord envisagée comme un stéréotype culturel, selon lequel les couleurs "signifieraient" quelquechose. L'interprétation **sémiologique** du SC est donc favorisée par notre mentalité, mais aussi par l'esprit structuraliste de l'anthropologie culturelle. Après un bref rappel sur la perception comme gnosie, on se tourne vers la ***Pensée sauvage***: Lévi-Strauss, en la définissant comme "une logique des qualités sensibles", a du même coup détruit le mythe de l'irrationalité de la pensée symbolique. D'autres clés sémiologiques sont empruntées à l'anglais Leach et à l'américain Turner. La conception sémiologique a été vivement critiquée par Sperber (1974), qui a proposé une **théorie cognitive** du "symbolisme en général". On montrera que cette théorie n'élimine pas le problème de la présence du sémiologique dans le champ du symbolisme, et ce point sera illustré par le ***Corps taoïste*** de Shipper. D'autre part, l'universalisme psychologique de cette théorie risque de restreindre abusivement la part réservée, depuis Durkheim, à la vie sociale dans l'élaboration des démarches mentales. Sur ce point précis, l'oeuvre de L. Dumont offre un relai décisif. En opposant deux modes de vie en société, l'Individualisme et le Holisme, Dumont met aussi en évidence deux modes de pensée: idées et valeurs sont strictement dissociées d'un côté (idéologie égalitariste), tandis qu'elles sont intimement conjointes de l'autre (idéologie hiérarchisante). Un disciple de Dumont, Tcherkézoff, nous propose (1983) un premier manuel d'**analyse hiérarchique**, qui nous ramène au SC africain. Le SC n'est donc pas, pour l'anthropologie culturelle, "un sujet en soi"; mais c'est un point de vue privilégié pour l'observation des enjeux épistémologiques de la discipline.

DIFFERENTIAL THRESHOLDS OF COLOR BY SUCCESSIVE COMPARISON METHOD

J.Romero, E.Hita and L.Jiménez del Barco

Chromatic discrimination aspects related with successive comparison of stimuli have been undertaken, in particular, the evaluation of differential thresholds of color obtained by this type of presentation. Considering previous works in this area, we have selected a method of comparison which allowed to obtain the thresholds under experimental conditions similar to those of Differential Colorimetry by simultaneous comparison. Constant stimuli method was employed and differential thresholds characterized by ellipsoids in the 1931CIE and CIELAB color representation systems. Experiments were carried out for five colors and three observers with normal color vision. In both systems, results show a similar behaviour of excentricity and orientation of ellipses in the chromaticity diagram compared with results for simultaneous comparison, widely accepted in the literature. Also, a litle variability of the thresholds for the different observers is obtained. Cuantitetively, significant differences are found with other authors simultaneous data and those obtained in our laboratory.

DISCRIMINATION CHROMATIQUE ET DEGRE DE METAMERISME

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On a analysé les résultats expérimentaux obtenus dans des expériences de discrimination chromatique lorsqu'on fait varier le degré de métamérisme d'une égalisation colorimètrique.

Dans ce but on a obtenu les seuils différentiels de chromaticité de cinq couleurs de tonalité blue, pourpre, rouge-orangé, jaune et vert-jaunâtre respectivement et avec deux observateurs.

Pour chaque couleur on a effectué trois égalisations avec différent degrés de métamérisme et une égalisation isomére dans le but de pouvoir comparer les résultats. La capacité de discrimination a eté caracterisé au moyen d'ellipses représentatives du seuil différentiel de chromaticité. Les paramètres que definissent les ellipses ont été analysés en fonction du degré de métamérisme, lequel a été calculé au moyen de différent indices que figurent dans la littérature.

Les couleurs de réference et de comparation ont été réalisés avec deux colorimétres visuels du type Donaldson. Dans les deux colorimétres on a employé des sources lumíneuses ídentiques et pour effectuer les différents égalisations on a utilisé des filtres de couleurs avec distributions spectrales trés différents de la distribution de la couleur de réference.

Les résultats on été exprimés dans différents systems de représentation de la couleur et on a pu observer des variations significatives dans les paramètres des ellipses de discrimination en fonction du degré de métamérisme, ainsi qu'un différent comportement des indices calculés.

Intervall-Buntheitsskalierung und gerade unterscheidbare Buntheiten für gleichhelle Farben.

Richter, Klaus, Priv.-Doz. Dr.

Von mehreren Versuchspersonen wurden "Buntheits-Skalierungen" für gegenfarbige Farbreihen, z.B. von roten über unbunte nach grünen Farben, sowie "gerade unterscheidbare Buntheiten" entlang dieser Reihen ermittelt. Hierzu wurden mehrere Farbfelder in unbunter Umgebung mit Projektionsfarbgeneratoren optisch so erzeugt, daß die Farben gleiche Leuchtdichte hatten und auch große Buntheiten erzeugt werden konnten.

Die "Buntheitsskalierung" nach dem Intervallverfahren führt zu Ergebnissen, die sich weitgehend mit der Buntheitsstufung im OSA-Farbsystem decken und z.B. im gesättigten Grün von der Buntheitsstufung im Munsell-System abweichen. Die Korrelation wird für verschiedene Farbenräume diskutiert. Die "gerade unterscheidbaren Buntheiten" haben in einem Farbenraum, der für die Experimente "Buntheits-Skalierung" zu gleichen geometrischen Abständen führt, geometrische Abtände, die von Unbunt zur Buntfarbe um bis zu einem Faktor drei zunehmen. Daher sind zur Beschreibung beider experimentellen Ergebnisse, die in der Farbwiedergabe-Bewertung (Beurteilung von Buntheiten) und Farbabstands-Bewertung (Beurteilung von gerade untercheidbaren Buntheiten) eine besondere Rolle spielen, zwei verschiedene Farbräume erforderlich, die vorgestellt werden.

Interval Scaling of Chromaticness and just noticeable chromaticness for equiluminous colors

Two different experiments of observers: the interval scaling of chromaticness and the assessment of just noticeable chromaticness must be described by two different color spaces.

L'échellesation des intervales des chromie et les chromie justement discernable de luminances égales

On a trouvé, par deux expériances différéntes que l'on a besoin de deux différéntes éspaces des couleur pour décrire l'échellesation des intervalles et pour l'evaluation des chromies justement discernable.

Schwellenwertellipsoide in CIE-Farbbereichen: Beobachtervariabilität

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Für 4 der 5 von der CIE vorgeschlagenen Farbbereiche wurden Lackfarbmuster mit kleinen Farbunterschieden ausgefärbt. In jedem Farbbereich wurden Paare von Farbmustern ausgewählt, die im Raum der valenzmetrischen Farbdifferenzen statistisch um den Nullpunkt herum verteilt waren und bis in den angestrebten Grenzbereich sicher erkennbarer Farbunterschiede reichten. Dadurch erhielten die Wolken der Farbdifferenzen eine von Fall zu Fall andere äußere Gestalt. Visuelle Abmusterungen und Bedingungen der Farbmessung wurden aufeinander abgestimmt (Geometrie 45/O, Normlichtart D65, 10°-Normalbeobachter). Die visuelle Aufgabe lautete, einen erkennbaren Farbunterschied anzugeben. Die Korrelationen zwischen visueller Abmusterung und farbmetrischen Ergebnissen ließen einen erheblichen Einfluß des Beobachters erkennen. Die Aussagen des Friedman-Tests für die Rangordnung der Beobachter, die Streuungen der Urteile und die Änderungen von Ellipsoidparametern werden für einzelne Beobachter und Beobachtergruppen ausgewertet.

Colour discrimination Data for Surface Colours.

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Available colour discrimination data for surface colours have been analysed to produce 132 reliable chromaticity discrimination ellipses. The θ and a/b values varied systematically over the chromaticity diagram, the patterns from acceptability, perceptibility, textile and non-textile ellipses being very similar.

New experimental data were used to adjust the sizes of the ellipses. The sizes of the original ellipses within any one large group of data were in error by a factor of two or more. Comparing colour-differences for different colours appears to be much more difficult than has previously been realised.

All the perceptibility data has been combined on to a common visual scale, so that colour-difference formulae can be tested using one combined set of data. The CMC formula gave the best fit, much better than the CIELAB formula.

Plots of ellipses corresponding to constant CMC ΔE have been compared with the ellipses from the experimental data. Systematic discrepancies were found for some colours, e.g. saturated blues and reds. Modifications have been made to the CMC equation resulting in even better fits to the combined set of data.

Metameric Mismatch Limits of Industrial Colorants

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Colorant formulations resulting in metameric matches continue to be a common industrial problem. When we consider that the variety of light sources available to the illuminating engineer steadily increases and that most computer colorant formulation techniques are based on tristimulus matching for only one or two illuminants, this problem could become quite acute. Accordingly, it is of interest to calculate the metameric mismatch limits resulting from changes in the spectral character of the illuminating source for colorants commonly used in industries such as textiles, polymers, and coatings. By determining the volume of these mismatch limits and their position in chromaticity space, the metameric potential between different products can be quantitatively determined. It is expected that the colorants used in certain industries will yield mismatch limits which frequently intersect indicating a potential reduction in metameric matches; for other colorant sets, there may rarely be mismatch limits which intersect thus metameric matches will frequently occur. In previous research, these mismatch limits were calculated based on either colorants from a single industry (Keuhni) or theoretical "colorants" (Ohta and Wyszecki). It is our intention to show how important this problem may be.

CIELAB: The ideal system for colour quality control and communication.

K. McLAREN NEWBURY

CIELAB space is probably the most uniform Euclidean colour space possible. It has been extensively used for colour quality control in industry particularly when the defects of its non-uniformities have been overcome by the optimised colour difference formula known as M&S 83A. Its superiority for shade sorting has been enhanced by the use of the mathematically perfect hollow block, the truncated octahedron. Although in the CIELAB system every colour is defined numerically the designations are actually easier to understand than the alphanumeric system of Munsell which it closely resembles.

The CMC Colour Difference Formula and its Performance in Acceptability and Perceptibility Decisions

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The CMC colour difference formula was developed by the Colour Measurement Committee of the Society of Dyers & Colourists to remove certain anomalies in the JPC 79 formula. The new formula gives better performance than CIELAB over a wide range of visual perceptibility and acceptability data.

La formule CMC de différentiation des couleurs a été mise au point par le Comité Mesurage des Couleurs du Society of Dyers and Colorists, en vue d'eliminer certaines anomalies de la formule JPC 79. La nouvelle formule s'acquitte mieux que CIELAB sur une gamme étendue de données concernant la perceptibilité et l'acceptabilité.

Die CMC Farbdifferenzformel wurde vom Komittee Fur Farbmessung des Britischen Farbervereins (Society of Dyers and Colourists) entwickelt, um gewisse Anomalien in der JPC 79 Formel zu beseitigen. Uber einem weiten Bereich von Wahrnehmbarkeits - und Annehmbarkeitsdaten gibt die neue Ausarbeitung bessere Ergebnisse als die CIELAB Formel

M., Dr., Physicist

András Hadnagy, Budapest

Modification of Taube and Berger whiteness formulae

A very important problem of my nearly ten years' research work was related to interpretation and formulation of whiteness. Research on whiteness is connected with the creation of numerous colour systems. We possess some results concerning the interpretation of lightness, hue and saturation and the incorporation of these quantities on the whiteness formula. The whiteness formula which is easy to apply industrially, is of the form $W = V - T$, where V represents lightness and T is the measure of saturation expressed in one of the colour systems.
The formulae according to Taube, Berger and more recently to the CIE recommendations have a common drawback: they are not interpreted in the uniform colour systems. It is completely unintelligible e.g. why the CIELAB system does not include a whiteness formula.
The whiteness formula recommended by me and interpreted in the CIELAB system is as folows:

$$W = L^{*} - 0{,}9\sqrt{a^{*2} + b^{*2}}$$

I have revised the possibilities of modifying the Taube and Berger formulae and utilized a psychometric function.

Problems of colour associated with airfield landing slope indicators

M.B.Halstead and B.W.Jewess

One of the important visual aids to a pilot when landing an aircraft is a landing slope indicator which indicates the approach path that the aircraft is following. Changes in the elevation of the approach are indicated by signal lights which change rapidly from red to white.

This paper describes the development of a two colour projection unit which has a very sharp transition from red to white. Problems were encountered in measuring the colour of the beam across the transition since the measurements had to be made at a much shorter distance than that at which the unit is normally seen. Subjective estimates of the sharpness of the transition were made at a distance similar to the operational distance. The subjective assessments were always considerably smaller than the measured transitions. This lack of agreement between the measured transition angle and the subjective estimates of it was investigated since objective measures are needed for the specification of the performance of the units.

QUESTIONS CONCERNING THE VIEWING OF COLOR VIDEO DISPLAY MONITORS FOR BEST COLOR PERCEPTION AND COMPARISON TO STANDARD REFLECTANCE COLORED SURFACES

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Summary

The profusion of color video display monitors throughout the world gives rise to the question of color perception by this method. Viewing conditions of low room illumination are common in an effort to emphasize the color saturation of video monitor images. Many users do not need to make an immediate or direct comparison to an existing color; however, in some industries it is highly desirable to be able to make such comparisons. The rules for proper comparison of color video display images with reflectance surfaces are essentially non-existent. The purpose of this paper is to raise as many of the questions in public that have been discussed in private, and it is hoped that investigations will develop into the critical nature of the variables involved in the observation of color on video display monitors.

TERRES RARES ET COULEUR - APPLICATIONS INDUSTRIELLES

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La synthèse de couleur est une des applications essentielles des oxydes de terres rares séparés. La raison principale de cette utilisation est liée au remplissage progressif d'une couche électronique 4 f interne lorsque l'on passe du lanthane au lutécium. La protection qui en résulte vis à vis des champs extérieurs induit des transitions électroniques entre niveaux discrets et peu sensibles à l'environnement de l'ion terre rare ; tant au niveau de l'absorption que de l'émission de lumière, les terres rares se caractérisent donc par des propriétés tout à fait remarquables, en termes de chromaticité des couleurs obtenues, trouvant des applications très particulières dans les domaines de l'industrie verrière, de la céramique ou de l'électronique.

L'absorption sélective de la lumière par les terres rares permet l'obtention d'effets spéciaux lors de leur introduction dans les verres : coloration artistique par le néodyme (bleu-violet), le praséodyme (vert), l'erbium (rose), décoloration et protection anti rayonnements par le cérium (blanc et absorbant UV), transparence parfaite parfaite grâce au lanthane. Dans le domaine de la céramique, l'oxyde de cérium est un excellent opacifiant des émaux et les pigments jaunes de praséodyme ou orangés d'yttrium sont utilisés pour la coloration à haute température.

Les terres rares peuvent aussi donner lieu à des phénomènes d'émission, et de gros progrès technologiques ont pu être effectués grâce à l'utilisation de luminophores aux terres rares (yttrium, europium, gadolinium, terbium) dans les applications telles que télévision couleur, éclairage fluorescent ou radiographie médicale. Les caractéristiques spectrales très spécifiques des ions terres rares et notamment leur émission sous forme de raies étroites leur permettent de répondre à des impératifs très particuliers de chromticité ou de brillance globalement liés à une amélioration du rendement de l'appareillage.

A COMPUTERIZED COLOUR ATLAS FOR DIGITAL IMAGE DISPLAYS

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Abstract

Electronic colour displays are increasingly used in various applications such as computerized systems for presentation of information, computer graphics etc. Such colour displays are also being used for research on visual perception. The colour order systems developed for surface colours have so far rarely been used for colour in television and display systems.

At FOA 53 we have for our digital image display system developed a "Computerized Colour Atlas (CCA)" from the NCS system, the CIELAB and the CIELUV systems. Although the NCS system as illustrated in the NCS Colour Atlas is based on visual judgements of colour samples, we think the concept might as well be used for colours displayed electronically. Our major aim in using these different colour spaces is to get the most appropriate colour space for the specific task at hand.

The CCA and its use in various applications will be discussed at Mondial Color 1985.

Paper Presentation: The Image Coordinate System of Color Combinations

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Extending the content of poster presentation "The Color Combination based on the Color Image Scale" in 1981 at AIC Berlin, we attempt to develop the principle of the Image Coordinate System of Color Combinations in a personal computor.
The paper will mainly consist of two following parts:

I. Development of the System
 1)Process of inputting the Hue and Tone Color System in a personal computor and arranging it with the primary colors (additive) R,G,B.
 2)Process of inputting the Color Image Scale, based on 1).

II. Development of the Software for Color Combinations
 1)Making tri-color-combinations freely among 130 colors (120 chromatic colors and 10 achromatic ones) in the Hue and Tone system.
 2)Sorting the tri-color-combinations by images and inputting them in a personal computor (10 color samples are given for each 72 selected images).
 3)Determining the image of a tri-color-combination in reference to 72o color images inputted in 2).
 4)Developing the applied system in future.

*If possible, we would like to demonstrate simulations in the personal computor NEC 9800.

HDTV - A CHANCE FOR BETTER COLORS IN TELEVISION

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High Definition Television (HDTV) is the name for TV systems with higher picture resolution, achieved by an increased number of TV lines and of resolvable picture elements per line. A new standard is therefore necessary for HDTV and is under debate in various committees.
We propose to incorporate the following features into this new standard allowing for better color rendition. These proposals take into account that future HDTV receivers might use image devices different from CRT.
1) Receiver primaries are not standardized.
2) Video signals are generated in the camera (telecine) using spectral pick-up characteristics without negative lobes. The resulting signals would always be in the limits between black and white. For example these signals could be proportional to the CIE standard tristimulus values X, Y, Z.
3) The transmitted video signals are linear combinations of the camera signals and contain a luminance signal proportional to Y and two chrominance signals for example proportional to X - Y and Z - Y .
4) Adaptation of the video signals to the individual receiver primaries by linear matrixing and compensation for nonlinearities are carried out in the receiver.

The Convergence of Brightness (luminance) and Hue (chroma) in the Domain of Color

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Western science regards the field of color as a unified domain whose main parameters are hue and brightness. Color-naming in Western languages merges hue and brightness into a composite set of 'basic' categories (BWG;ROYGBV); at a more specific level, priority is usually given to hue, with modifying terms expressing brightness (e.g., light green, bright green, dark green) or, in some cases, a third parameter, saturation (pale green, deep green).

Influenced by the Western view, cross-cultural studies of color perception and terminology have assumed the universality of a unified domain of color. But in non-Western languages, brightness and hue often appear to be separately encoded, in terms which constitute discrete lexical sets, or even in different grammatical constructions. In other cases, we find a related distinction -- between extrinsic color and intrinsic color. In either case, there may be no compelling evidence for the existence of a super-ordinate domain of color; a lexical label for such a category is, in fact, absent from most non-Western languages.

Colonialism and acculturation, bringing the influence of a dominant Western culture and language, is invariably reflected in broad semantic changes in all lexical fields, including that of color. The Western model, or gestalt, of color is quickly imposed through the establishment of translation equivalences in vocabulary, borrowing and loss of terms, and shifting of the areas of reference of terms. Because of its accessibility through testing, the color lexicon could be a useful indicator of the extent of 'modernization' (or Westernization) of Third World peoples.

Examples to support the presentation will be drawn from Arawak (studied by the author), Torres Straits languages (from Rivers, 1902), Zuni (Lenneberg and Roberts, 1956), and other sources.

DIFFERENT USE OF COLOUR IN ART

URBAN WILLUMSEN SANDEFJORD, NORWAY

As far as we know back in history colour allways has been used as an art remedy, in all sivilizations and cultures.

But the way colour is used changes, from one country to another, from one district to another, from one valley to another. It also changes from one epoch to another, gotic art uses colour in another way as what the baroque does, and the impressionistic use of colour is quite different from the expressionistic one. One individual artist uses colour in his way, another artist in his specific way. And each artist very often changes the use of colour from one canvas to the next one, according to what the theme means to him. As an example we may mention Claude Monets paintings of the cathedral of Reims. From exactly the same point of view, - his hotel room across the street -, he painted the same motive about 40 times. But the colours changed all the time, just according to the changing light during the day.

This is an attempt to map the different ways of using colour in art, and the intentions behind.

LES USAGES SOCIAUX DE LA COULEUR

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La sociologie des couleurs a été jusqu'à présent négligée, au profit des approches dites psychologiques et surtout de la colorimétrie. On tend aujourd'hui à prendre conscience du relativisme culturel où il convient de resituer les analyses les plus mathématiques à prétention universaliste.

Une théorie sociologique des couleurs, comparant les structures des systèmes de couleurs et des systèmes sociaux où elles ont cours, ainsi que l'idéologie des théories et des usages des couleurs (esthétique, psychologie, communication, etc.) avec l'idéologie dominante de chaque société ou communauté sociale, permet, en s'appuyant sur les évolutions historiques connues, de comprendre l'interaction entre couleurs et sociétés, les usages sociaux de la couleur dans l'histoire de la peinture, de la mode, de l'architecture, etc. On assiste à des phénomènes de "géométrisation", de structuration ou de déstructuration, de codage, décodage, construction mathématique de modèles, etc., qui semblent suivre ou refléter très étroitement les changements sociaux eux-mêmes.

Une théorie sociologique des couleurs contribue donc à l'analyse de l'évolution de l'idéologie des couleurs couleurs, mais aussi à l'analyse des mouvements sociaux.

– Une colorimétrie esthétique –

Mr Dominique BLAISE

LYON

Mesurer la dimension esthétique de la couleur semble une gageure. Les conclusions des travaux de type fechnérien, de la psychologie expérimentale ou de la sociologie du goût semblent fragmentaires et inconciliables. Pourtant, les praticiens continuent de décrire les qualités des ensembles colorés qu'ils conçoivent. Ils utilisent pour cela des modèles légués par la tradition et remodelés par le contexte scientifique, technique et artistique.

Examinant quelques uns de ces modèles en comparant des texts de coloristes (chercheurs / artistes / techniciens / professeurs) datant du XVIIIe siècle jusqu'à nos jours, nous dégageons un certain nombre de descripteurs esthétiques. Ils s'agit principalement d'analogies musicales et d'une élaboration empirique de la théorie des classes de couleurs, extrapolée d'une théorie des perceptive classes de mélanges de colorants.

Nous tentons ensuite d'évaluer la pertinence de ces descripteurs à l'aide des connaissances scientifiques et de la théorie de l'art.

Enfin nous montrons comment le recours à ses descripteurs dans la pédagogie de la couleur permet de vérifier leur caractère opératoire.

Les usages sociaux de la couleur à l'usine

POT Marie-Dominique - Nantes.
Sociologue -

Plus que la couleur, la mise en couleurs des espaces de travail industriels pose question. Déléguée depuis la seconde guerre mondiale par le fait d'une division du travail récente en la matière, à des spécialistes de l'esthétique industrielle : les coloristes, elle s'inscrit, d'une part, dans le cadre d'une normalisation relative à la sécurité et, de l'autre, engage des définitions implicites plus qu'explicitées de l'esthétique. La dépossession de l'espace qui en découle pour les usagers, donne lieu à de multiples formes de réappropriation en rapport avec les fonctions de marquage et de masquage social des programmes de coloration. Permise et imposée par l'amélioration des technologies, cette mise en couleurs est liée aux crises et restructurations de la production dans les onze entreprises nantaises étudiées. Souvent rapportée à la notion d'ambiance, elle structure l'espace, accroissant sa rationalité et le rend immédiatement intelligible sur le principe du panoptique.

COLOUR – A MAJOR "STRESS-RELIEVING" FACTOR AS EXPERIENCED IN SPECIAL SPACES FOR CHILDREN: CHILDREN'S HOSPITAL WARD AND SCHOOL-SHELTER

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CHILDREN REACT TO COLOUR DIRECTLY AND MAINLY EMOTIONALLY BECAUSE OF THEIR STILL LOW-LEVEL OF SOPHISTICATION IN PERCEPTION OF THE ENVIRONMENT. THAT'S WHY THE PSYCHOLOGICAL INFLUENCE AND EFFECT OF COLOUR IS SO VITAL IN THE CHILD'S ENVIRONMENT.

IN SPACES WHERE THE CHILD IS UNDER SPECIAL EMOTIONAL STRESS, BECAUSE OF BEING DETACHED FROM HIS USUAL ENVIRONMENT OR BECAUSE OF LOCATION AND NATURE OF SPACE, COLOUR IS A MAJOR FACTOR BY WHICH THE COLOUR-ARCHITECT IS ABLE TO CREATE A SPACE WHICH GRANTS THE RIGHT LEVEL OF SENSORY STIMULI, TO RESTORE PSYCHOLOGICAL BALANCE, AND THAT WITH NO NEED OF MAKING STRUCTURAL CHANGES.

THE COLOUR-PLAN FOR THESE SPACES IS BASED ON A FEW CRITERIA WHICH ENSURE COMFORT AND LESSEN STRESS: CORRECT ORIENTATION, PREFERRED COLOURS, NEEDED COLOUR ASSOCIATIONS, BALANCED VISUAL CONDITIONS (LIGHT, CONTRASTS, ETC.), COMFORTABLE PROPOTIONS AND DIMENSIONS OF SPACE, RIGHT LEVEL OF VISUAL STIMULI AND ENRICHMENT OF SPACE TO MAKE THE ENVIRONMENT MORE INTERESTING, PLEASANT AND SATISFYING

La sensibilité dermo-optique aux surfaces colorées

Yvonne DUPLESSIS

Présidente de la Commission d'Etude de
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Nos yeux ne perçoivent qu'une partie limitée du spectre électromagnétique, et les couleurs et les formes que nous voyons ne sont que des interprétations, par notre cerveau, de ces radiations lumineuses.

Cependant, même invisibles, des radiations nous enveloppent de toutes parts et il serait étonnant qu'elles restent sans influence sur notre comportement. Or des recherches menées depuis plus d'une vingtaine d'années, aux USA, mais surtout en URSS et en France, ont montré que la peau est le révélateur de ces radiations invisibles. Elles seraient situées, selon une hypothèse de la physique, dans l'infrarouge lointain.

La sensibilité dermo-optique est donc la capacité de l'homme de réagir à des surfaces colorées, dissimulées à sa vue, et qui peuvent être placées sous des écrans opaques, même si le sujet s'en trouve à quelque distance, ou s'il est dans l'obscurité.

La perception dermo-optique se rapporte à la prise de conscience de ces réactions organiques par des impressions subjectives, non visuelles, qui peuvent être thermiques, pondérales ou autres.

Les réactions dermo-optiques, inconscientes ou conscientes, se distribuent dans un ordre analogue à celui des couleurs dans le prisme, mais il s'inverse selon les conditions de l'éclairage comme le montrent les résultats des diverses méthodes d'investigation.

Notre méthode subjective permet d'entraîner des sujets à la différentiation consciente des surfaces colorées dissimulées à leurs yeux.

Des méthodes objectives, élaborées surtout en URSS et par nous-même, permettent d'enregistrer et de mesurer les effets dermo-optiques inconscients.

De nombreuses applications se dégagent de ces recherches. Elles se rapportent à la pédagogie, à la décoration des lieux d'habitation, des lieux de travail, etc....

Les conséquences de ces travaux pluridisciplinaires paraissent donc importantes tant sur le plan de l'investigation scientifique : physique et physiologique, que sur celui des applications dans les divers domaines de l'activité humaine.

VENDREDI 21 JUIN
FRIDAY, JUNE 21

COMMUNICATIONS AFFICHEES
POSTER COMMUNICATIONS

SALLE DES POSTERS
POSTER ROOM

SESSION 4

DEMERS P.

COULEURS ET COHERENCES : SYNTHESES COLOREES AVEC DES FAISCEAUX COHERENTS.

Résumé non parvenu
Abstract not received

The generalization of the Weber-Fechner's law

Witold Raduj Kraków

Sensation arises according to the change of the stimulus and not only to its growth - as it is described by the Weber-Fechner's law. This law, widely applied in music, is hardly applicable in fine arts. The lecture presents the generalization/increase/ of the dependence between the stimulus and sensation. The paper contains a formula describing the level of sensation caused by the decrease of the stimulus, and the definition of a sensation-free background.

Généralisation du lois Weber-Fechner

Les sensations se produisent après un changement d'un stimulus et non seulement pendant sa croissance,comme cela est présenté par le droit de Weber-Fechner /appliqué p. ex. en musique/. Ce droit est pratiquement sans application dans les arts visuels. L'élargissement de dépendences stimulus-sensation est le sujet de mon travail.

Generalisation das Weber-Fechner-Gesetzes

Die Empfindungen entstehen bei der Reizänderung und nicht nur bei seinem Zuwachs, wie es das Weber-Fechner-Gesetz beschreibt,das wesentliche Anwendung z.B. in der Musik hat.Dieses Gesetz hat eigentlich keine Anwendung in der Malerei.Zum Arbeitsthema ist die Generalisation der Reiz-Empfindung-Bedingtheit.

Prof. Dr.-Ing. Peter Marx / Technische Fachhochschule Berlin

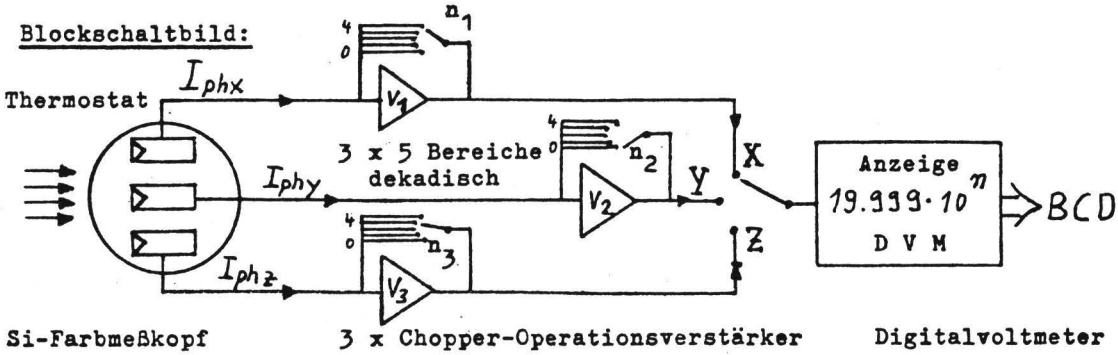
Präzisions-Beleuchtungsstärke- und Farbmeßgerät

Empfänger: Silizium-Farbmeßkopf mit Präzisions-Partialfilterangleich für die Normspektralwertfunktionen $\bar{x}(\lambda)$, $\bar{y}(\lambda)$, $\bar{z}(\lambda)$; 2°-(10°)-Gesichtsfeld, thermostatisiert.

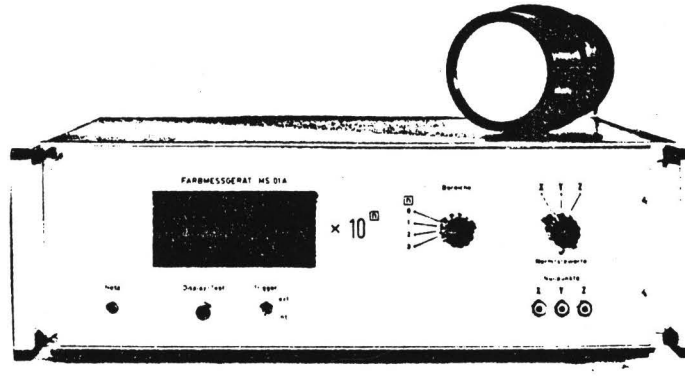
Elektronik: Spezial-Meßverstärker für die Photoströme mit drei chopperstabilisierten Operationsverstärkern - linearer Kurzschlußbetrieb. Digitalanzeige: Automatisches Digitalvoltmeter mit Dual-Slope-Prinzip, Auto-Zero, Anzeigeumfang: 00.000.....19.999 x 10^{n}; n = 0,1,2.3,4 für die drei Normfarbwerte X,Y,Z; Anzeige Y entspricht der Beleuchtungsstärke in lx; E(lx) = 00.000.....19.999 x 10^{n} lx; n=0..4

Die Verstärkungsfaktoren können für die drei Kanäle (X,Y,Z) getrennt gewählt werden. Hierdurch erhält man eine sehr hohe Meßgenauigkeit bei buntem Licht.
Das Gerät besitzt einen BCD-Datenausgang zum Anschluß an Rechner, Drucker, Fernschreiber usw.

Blockschaltbild:



Si-Farbmeßkopf | 3 x Chopper-Operationsverstärker | Digitalvoltmeter



Ansicht Farbmeßgerät

RESEARCH ON COLOUR IN FOODS: NON-ENZYMATIC BROWNING.

Buera, M.P.*; Lozano, R.D.*; Petriella, C.**.

Non- enzymatic browning is a factor of quality damage during processing or storage of foods. This research is being carried on liquid model systems with high water activity (a_w 0.90) [1-4].

Several variables were modified to observe the chromatic behavior under different storage conditions. Sugars (glucose, saccharose, fructose, lactose) and aminoacids or peptides (glycine, lysine, glycilglycine, and triglycine) were changed to observe colour variations in function of different temperature (from 35 to 65ºC) and time of storage for different pH of the solutions.

The results show the effect of these variables on the development of brown colour.

Kinetic equations are obtained for some of the systems. Other interesting conclusions can be deduced from the data obtained. A summary of these findings is presented.

References:

1. Petriella, C.; Resnik, S.; Chirife, J.; Lozano, R.D. Proc. Symp. Colour in Foods, p. 21, Buenos Aires, 1982.

2. Petriella, C.: Tesis Magister Scientiae.CIC.1983.

3. Buera, M.P.; Chirife, J.; Resnik, S.; Lozano, R.D. Proc. Symp. Colour in Foods, Buenos Aires, 1984 (in press).

4. Petriella, C.; Chirife, J.; Resnik, S.; Lozano, R.D. Proc. Symp. Colour in Foods, Buenos Aires, 1984 (in press).

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Color Study of Japan Traditional Foods in Local City-Kanazawa

MORI YOSHINORI, YAMAGISHI MASAO

KANAZAWA JAPAN

Our study is to find out the color formation on the traditional foods by the means of scientific approarch.By using the method of mesh analysis,chromaticity diagram was plotted by the dots measured by colorimetry.

Traditional foods are cooked fundamentally based on the freshness and the nature of the material.Together with the right combination among various kinds of tableware which are made of porcelain,woods, bamboo and metal,they are visually characterized as the foods to see. Our study is to find out the color formation on the traditional foods by the means of scientific approarch.By using the method of mesh analysis,chromaticity diagram was plotted by the dots measured by colorimetry.As the result,the color of the foods are most frequently appeared between 565nm~610nm,especially between 570nm～580nm. Analogous and complementary color relationship between foods and the tableware was also recognized.

INSTRUMENT;HITACHI 607 COLOR ANALIYZER, HEWLETT-PACKARD 7585 B PLOTTER

The possible use of flour whiteness testing in the milling industry

dr. Joseph MOÓR
/Research Institute of the Milling and Baking Industry, Budapest, P.O.B. 306. 1536 Hungary/

We have carried out our experiments with the instrument LEUKOMOM produced by the Hungarian Works for Optics in Budapest.

We have studied the effect of particle size on flour whiteness on 7 different flour types. Commercial flours were further ground by grinding machines including various units like e.g. hammer mills, flat rolls, etc. Variation of particle distribution was determined by sieve analyses. As a result of grinding the fractions of smaller particle size were segregated, the amount of mechanically damaged starch content of flours increased, the value of Y and Z colour components also increased, moreover flours became lighter when studying by the organoleptic Pekar-test.

Big grinding capability is the most significant characteristic of wheat mills operating with modern milling technology. Grinding capability can be well illustrated by plotting ash content as a function of flour yield percentage. For making a comparison, the classical MOHS curve was used. There is a negative linear connection between the ash content of the half-manufactured milling products and the Y as well as Z colour components. Ash content determination is a tedious and time-consuming work as compared to the simple instrumental whiteness-testing. The results of a short-time whiteness testing can be equally used for the quick estimation of the ash content as well as for the characterisation of the milling capability on the basis of a close correlation between ash content and colour components.

"A COLOR AND LIGHTING PROPOSAL FOR IMPROVING FOUR HEALTH CARE ENVIRONMENTS"

A Poster Session

Christina M. Burton
Texas Tech University
Art Department Box 4720 Interior Design
Lubbock, Texas 79409 U.S.A.

Four health care spaces are selected to demonstrate how design decisions concerning color and light can be improved through the application of research and literature and observations and experience with health care users. The spaces are selected from interior design publications in the United States. The four environments include two patient rooms, one on a mental health unit and one on a birthing unit, a visitors lounge on a special care unit, and a nursing station on a medical unit. Each space is discussed in terms of: user requirements, analysis of existing space, and proposed changes based on research.

The "User Requirements" provide a summary of the essential elements necessary to satisfy user needs of that specific environment. In the "Analysis of Existing Spaces" the color and lighting schemes and use of pattern are evaluated for their application and appropriateness for that specific environment. After utilizing the user requirements, analyzing the existing space, changes in the color and lighting schemes are proposed. These changes are based on information gained through review of the literature and experience in health care facilities, and observations of health care users.

The format for the Poster Session is a photograph of each of the original publications with text and explanation and a color rendering of each of the proposed spaces with text and explanation. The visuals are presented by one board of 12 1/2"x15" and eight boards of 22"x25 1/2".

Language - English

COULEUR ET ESPACES DE TRAVAIL

DESOMBRE PATRICK PARIS.

La couleur explose dans notre environnement quotidien.
Par contraste, les bureaux et les usines dans lesquels nous travaillons demeurent le plus souvent des univers ternes, anonymes et ennuyeux.
Pourtant la maintenance d'un matériel de production de plus en plus sophistiqué rend nécessaires les dépenses d'entretien qu'autrefois on aurait pu considérer comme un luxe facultatif. Ajoutons qu'un personnel de plus en plus hautement qualifié attache une importance grandissante aux conditions de travail et à la qualité de l'environnement dans l'usine.

La peinture, appliquée pour assurer protection et propreté, peut ainsi, par le choix et l'harmonie des couleurs jouer un rôle de premier plan dans l'amélioration des conditions de travail: comfort visuel, sécurité, signalisation, ambiance.
Mais il faut reconnaître que la réussite d'une harmonie colorée ne peut résulter de l'improvisation ou du laisser-faire sur le tas; trop de paramètres rentrent en ligne de compte: architecture des batiments, genre de travail, personnel, sécurité, contraintes spécifiques, insertion dans un contexte régional etc...
Le coloriste, par son expérience, sa capacité de travailler en équipe, sa sensibilité artistique, sa connaissance des effets de la couleur liée à l'éclairage, sera à même d'appuyer ses propositions sur un diagnostic approfondi du problème à traiter.
Il lui restera encore, à intégrer ~~à son appréciation personnelle~~ le désir des travailleurs d'intervenir ~~en tant que groupe~~ dans le processus d'élaboration de leur cadre de travail. Ouvrant le dialogue dans une démarche participative avec les différents partenaires, il a alors les meilleures chances de réussite.

ARTISTIC USE OF COLOUR IN A PSYCHIATRIC CLINIC

URBAN WILLUMSEN SANDEFJORD, NORWAY

Based on a practicle job, going to be finished during 1985, the author makes a documentation of his planning of colours and decorative art for a hospital of psychiatry.

The building is under execution, and the paper tells about the team work between the Departement of Culture, the Clinic Direction, the Architect and the Artist. The author, being the artist in this case, based his work on discussions between actual members of that team.

This special task asked for a special solution. The coming clients are mostly going to stay in the hospital for a long time, most of the time isolated from their relatives. At the same time a hospital very often may give an impression of coldness, sterility and unfriendliness.

The author found that, in such a case, colour planning and artistic colour decorations might contribute to a more friendly and home-like milieu.

The paper is documented by scetches/slides.

L'oeil peut additionner, soustraire ou intégrer les couleurs des objets

Ellen Marx

Jumeauville
78580 Maule

Quelles sont les conditions expérimentales qui nous permettent de démontrer que l'interaction de la matière dans la synthèse soustractive (exemple: imprimerie) opposée à l'interaction de la lumière dans la synthèse additive (exemple: télévision) sont réductibles à un processus psycho-physiologique antagoniste et complémentaire? Elles nous font également comprendre pourquoi le jaune p.e. ne possède pas une complémentaire unique mais qu'elle peut être bleu ou bleu-violet suivant les conditions de synthèse.
Par ailleurs, il s'agit de montrer pourquoi la synthèse optique réalisée avec des disques tournants ou des trames infraliminaires n'est pas assimilable à la synthèse additive.

L'expérimentation s'opère avec les trois primaires soustractives (jaune, cyan, magenta) face aux primaires additives (bleu-violet, rouge-orange, vert) qui correspondent aux six seuils chromatiques. La création des seuils physiologiques dans l'image successive et pour les complémentaires du blanc, du noir ou du gris, devient possible à partir de la focalisation de deux surfaces colorées séparées dans l'espace mais réunies dans un seul temps de fixation. Cet espace peut être un champ environnant blanc qui incite l'appareil visuel à additionner les énergies contrairement à un champ environnant noir qui les soustraient sans pour autant diminuer la saturation. L'intégration résulte dans une projection successive à partir de la focalisation de deux plages de couleur juxtaposées.

Couleurs et psychologie industrielle

Pierre-Jean DELPEUC'H, designer
BECI, 18, avenue Parmentier 75011 PARIS

Question couleurs, les industriels n'ont pas de position nette ni d'opinion ferme.

La conception de nouveaux produits fait apparaître des critères de choix bien minces en matière de couleurs. Le sentiments personnel a pour effet de reconnaître "utile" un nombre limité de couleurs.
L'homme moyen industriel a l'habitude de "voir" par lui-même, dans des conditions culturelles et sociales qui restreignent forcèment son choix. L'environnement ouvre sur un foisonnement de couleurs qui impressionnent et intimident le decideur qu'il est. Le chef de projet, le responsable de fabrication, le projeteur de bureau d'études, le responsable de marketing, la Direction, estiment avec difficulté si une couleur peut avantager ou non le produit.

Cet état de fait risque de faire échouer le lancement d'un produit ou, dans une moindre mesure, de faire dévier des objectifs visés par l'entreprise.

En face de cette situation, le designer-conseil, qui avec l'entreprise conçoit des produits nouveaux, a une vue globale du problème. C'est une nécessité.
La présentation du produit ou du système, la mise en couleurs d'un poste de travail, répondent à des critères parfaitement définis, en fonction des objectifs de l'entreprise.

L'homme vit en équilibre avec le milieu environnant, harmonisant à l'intérieur de lui-même des énergies opposées et complémentaires venant de la terre et du ciel.

Le déséquilibre psychique et physique apparait lorsque l'homme n'est plus capable de controler ces énergies.

Il est possible, par l'acupuncture, d'agir sur des perturbations énergétiques majeures, se traduisant, sur le plan clinique, par des dysfonctionnements psychiques et physiques.

Ces éléments subjectifs sont actuellement vérifiables, dans la majorité des cas, par la Photo Kirlian. Cette technique nous apporte des éléments diagnostics et des éléments de controle thérapeutique. Elle nous a ainsi permis de croire à une correspondance probable des fréquences lumineuses et des énergies habituellement utilisées en acupuncture.

Par injection oculaire de couleurs dans des conditions expérimentales précises, nous avons obtenu des réactions cliniques, parfois très violentes, objectivées à chaque fois par la Photo Kirlian.

Docteur AGRAPART
Docteur CORMONT
Docteur GUERIN.

Title - COLOUR IN COSTUMES OF INDIA

Name of the Author - R. P. Joshi, Mrs.Shalini Patwardhan, India.

Costume with its design, style and colour provides a visible index of homogeneity, unity, asthetic attitude, fashion trend, nature of customs, structure and aspirations of the society, India is a country of all types of climatic conditions with a historical background of more than 5000 years. Different communities are staying here for years together with the freedom of maintaining their traditional customs, languages and religions. Costume has been functioning here as a fashioner of personality and has been cultivated as an art. Colour, in Indian costumes has not only a social significance but also betokens temper, heart, intellect and talent. A gorgeous red ghaghara-choli outfit, exquisitely hand-embroidered with golden colour, interspersed with semi precious stones, a shimmering sequinned matching chiffon dupatta; a deep necked velvety dark coloured silk sheath with a tough of gold churridar Kurta in Angarkha style; an off-beat plain colour sari in cotton, silk or polyester with just one tastefully embroidered motif with complimentary colour scheme or totally printed with ornamental patterns and a matching colour hand-bag represent more or less the picture of an Indian woman of the present generation. Apart from the dress, silver and gold ornaments, jewellary in pink, red and green colours, make-up, hairstyle, flowers have brought elegance to the Indian personality of both male and female since ancient times.

"Pour une poésie du rationnel et vice-versa; l' héritage grecogitan en valeur dans une étude d' aménagement urbain à travers la couleur."

THEANO FANNY TOSCA THESSALONIKI / GRECE

Ils sont des gitans mélangés avec des réfugiés d' Asie Mineur et du nord de la Russie.On les a tiré de leurs baraques et leur a construit des immeubles en série afin qu' ils vivent dans l' ordre et l' isolement.
Leurs difficultés sociales entre eux ne les permettent pas de s' adapter à un environnement imposé,d' efficacité douteuse,qu' ils laissent méchamment détériorer.
Est-ce possible de leur organiser la vie par une intervention dans leur espace en base de la résultante de leurs préférences esthétiques individuelles par rapport à leurs besoins fonctionnels?'A quel degrès pourraient-ils eux-mêmes décider les modifications éventuelles?
Là il ne s' agit pas seulement de faire de l' art appliqué mais surtout de le rendre le médium d' identification d' un groupe social hétéroclite.

Color Planning of Power station

Planning des couleurs pour les centres d'électricité.

Tomie Inamine Kondo Color Laboratory
Tsuneo Kondo Osaka University of Arts

The infulence of large-scale architecture on landscape is significantly great. Much attention should be paid to the designing of color and shape of power plant which are danger of being minus elements to the environments. Designing should be considerd especially in a geographically small contry like Japan where such facilities may be located close to residential area. This paper deal with two cases of major power plants in Japan.

Les bâtiments de grandes proportions ont une grande influence sur le paysage. Il faut consacrer beaucoup d'attention à planifier les couleurs et les formes des stations éléctriques, centres électriques et stations de transformation parce que beaucoup de leurs éléments détruisent la beauté du paysage. Au Japon, en particulier, à cause du manque de place, il arrive souvent que les stations éléctriques voisinent avec les habitations; il faut donc que la planification soit spécialement bien pensée. Des recherches ont été effectuées, au Japon, pour 2 centrales éléctriques; on y a étudié l'harmonie entre l'environnement et les couleurs.

SAMEDI 22 JUIN
SATURDAY, JUNE 22
Matin
Morning

COMMUNICATIONS ORALES
ORAL COMMUNICATIONS

AUDITORIUM

TROSCIANKO T. - R.L. GREGORY

Conférence Invitée

HOW PERCEPTION IS COLOURED

Résumé non parvenu
Abstract not received