KSG Note & return [illegible] 9/9/35

INTER-SOCIETY COLOR COUNCIL

NEWS LETTER NO. 9

Notice from the Secretary

The Nominating Committee has placed in nomination the following names that will appear in a forthcoming letter ballot covering election of officers for the coming term:

for Chairman - M. Rea Paul
" Vice Chairman - Deane B. Judd
" Treasurer - M. H. Rorke
" Secretary - R. G. Macdonald

for Counsellors - F. L. Dimmick
W. F. Little
W. M. Scott

Ballots will be furnished all voting delegates within thirty days.

M. R. P.

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COMMERCIAL COLOR STANDARDS. A recent inquiry was received from the National Research Council of Canada, requesting information regarding commercial color standards in use in the United States. The following material was referred to, in the reply furnished by the Inter-Society Color Council:

United States Army Color Card, issued by the Textile Color Card Association of the United States, Inc., 200 Madison Avenue, New York, N. Y. This card shows 18 U. S. Army colors standardized for the different arms and services. It has been approved and accepted by the Quartermaster General as being in accord with the standards on file in that office. The samples are inch by half-inch rectangles of silk. This card is used in the purchase of textile materials by the Army.

Supplement to No. 3-1 and revisions thereof of the U. S. Army General Specification for Paint and Related Materials, issued by the Office of the Quartermaster General, Washington, D. C. This card shows 24 colors, identified by name and number. The samples are stiff paper, 1-1/2 by 5/8 inch rectangles, with glossy finish. This card is used in the purchase of paint and related materials by the Army.

Aircraft Color Cards, issued by the Bureau of Aeronautics, Navy Department. This is a group of twelve colors, seven of which are Army-Navy standards, and five Special Navy standards. The samples are 4 by 6-inch panels of cardboard having the semi-glossy finish due to paint applied by spray. They are used in the purchase of finishing materials for aircraft.

Porcelain enamel standards are issued by the Army Air Corps, Wright Field, Dayton, Ohio to manufacturers supplying the Air Corps or Air Corps contractors with paint materials. A standardization of toluidine red enamel was recently accomplished by spectrophotometric measurements expressed on the ICI coordinate system with illuminant C. Values and tolerances are given for x, y, and bar/y. Satisfactory working standards of this color were obtained in porcelain enamel.

The ICI system has also been used in specifying the standard red, white and blue of the flag of the United States (Federal Specification TT-C-591). In this case, spectrophotometric measurements of standard samples led to values of x, y, and bar/y, but no information has been collected leading to establishment of tolerances.

Colors and finishes for cast stone (recommended commercial standard Ts-2126) have been standardized by the adoption of 14 samples, 7 gray and 7 buff. These samples are non-uniform in various degrees depending on the finish. Measurements are under way whereby the average color will be specified in terms of x, y and bar/y.

Color for School Furniture, Simplified Practice Recommendation R111-30, obtainable from the Superintendent of Documents, Washington, D. C., price 5 cents. This publication contains a printed representation of the standard school furniture brown adopted by a conference of producers, distributors and users of school furniture. The printed reproduction of this color is intended only to indicate the color selected; stained blocks of wood are the actual standards used.

Colors for Sanitary Ware, Commercial Standard CS30-31, obtainable from the Superintendent of Documents, Washington, D. C., price 20 cents. This publication contains a printed representation of 6 standard colors adopted by a conference of producers, distributors and users of sanitary ware, including plumbing fixtures and allied products made of vitreous china, porcelain (all-clay), enameled iron, metals, wood, or glass. The printed reproductions of these colors are intended only to indicate the colors selected; vitreous samples are used as the actual standards.

Color System for Foundry Patterns of Wood, Commercial Standard CS19-32, obtainable from Superintendent of Documents, Washington, D. C., price 10 cents. This publication contains a printed representation of three colors to be used in marking patterns in order to indicate which surfaces are to be left unfinished, which machined, and so forth. Some variations of these colors are permissible within reasonable limitations.

The following publications contain color charts of use for general purposes:

Color Standards and Nomenclature, by Robert Ridgway, A Hoen and Company, Baltimore, Md., 1912. Contains approximately 1,000 named color samples, each sample being a matt or nearly matt paper rectangle one-half by one inch in size. The samples are arranged on each page with light samples at the top of the page grading down from white through eight steps to black at the bottom.

Each column shows colors of constant hue, the hue circle being represented by 35 such columns. The first series of hue columns gives samples whose colors are of maximal saturation, then there are four similar series, each showing colors progressively dulled by the addition of gray. The color names are listed alphabetically and the corresponding sample located by giving the plate number and an approximate hue, saturation, and brightness notation. These charts have been widely used for the specification of the colors of flowers, insects, and birds.

Munsell Book of Color, by the Munsell Color Company, Hoffman Brothers, Baltimore, Md., 1929, obtainable from Universal Color Standards, Inc., 500 N. Calvert Street, Baltimore, Md. Two editions, standard and abridged, each giving approximately 400 different color samples. The standard edition consists of charts, one for each of ten different hues, showing colors varying in brilliance (Munsell term: value) and saturation (Munsell term: chroma); there are also charts, one for each of eight chromas, showing colors varying in hue and value; charts, one for each of six values, showing colors varying in hue and chroma; and two charts showing altogether 20 hues at maximal chroma for each of eight values. The samples are rectangles of matt or nearly matt paper, 5/8 by 7/8 inches, except for those of the constant-value charts which are 1/2 by 5/8 inches. The abridged edition consists of 20 constant-hue charts made up of 1/2 by 5/8 inch samples. In both editions, the samples of the constant-hue charts are arranged in rows and columns, the samples in any one row being equally bright, and the samples in any one column being equally saturated. The colors progress from achromatic colors at the left side of each chart to saturated colors at the right by steps which are also visually equal. Each sample is identified by three symbols -- the first indicating hue, the second, value, and the third, chroma. These charts, because of the logical arrangement of the samples and the fact that the color differences between successive samples are visually equal, have a wide application; they are used in color education, in the setting of color tolerances, and as practical color standards.

A Dictionary of Color, by A. Maerz and M. Rea Paul, McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York, N. Y., Contains approximately 7,000 different color samples printed on semi-glossy paper, about 6,000 of which are 1/2 by 5/8 inch rectangles, and about 1,000 of the darker of which are 1-1/16 by 5/8 inch rectangles. The hue circle is covered in 8 intervals, each interval by a series of 8 charts each, the hues within each interval being obtained by mixtures of the pigments representing the extremes of the interval. The first chart in a series shows one extreme pigment at the upper right-hand corner, the other at the lower left. The upper-left corner is white, the lower right a mixture in about equal proportions of the two extreme pigments. The samples intermediate on the chart represent colors which are intermediate, and the color steps between successive samples have been adjusted so that they are, in general, about equal. Each chart, therefore, shows a progression of hues from the upper-right to the lower-left corner, while the hues of the samples along the lines parallel to the other diagonal are nearly constant. The second chart in a series differs from the first by admixture of a gray ink; the third chart corresponds to admixture of a darker gray ink; and so on down to the eighth chart which shows very dark colors. An alphabetical list of about 4,000 color names is given together with a key by means of which each corresponding sample may be found in the charts. These samples are also identified by name in the charts, themselves. The large number of the samples makes the steps between successive colors so small that interpolation is often not necessary. On this account they may be used conveniently as practical color standards in nearly every field. Furthermore, the scholarship and thoroughness of treatment have given this work a wide reputation as the foremost authority on color names.

Standard and Seasonal Color Cards, issued by the Textile Color Card Association of the United States, Inc., 200 Madison Avenue, New York, N. Y. The samples are inch by one-half inch rectangles of silk. Each sample is identified by name and cable number. The standard cards are revised only infrequently and show about 200 staple colors. Two seasonal cards are issued every year, a spring card and a fall card; they supplement the standard card. These cards are widely used in the textile and allied industries, and are there the accepted authority.

The paint industry has set up a standard specification as a means for assisting in the retention of color standards. This specification, published by the American Society for Testing Materials, under title of "Standard Method of Analysis for the Color Characteristics of Paints in Terms of Fundamental Physical Units" (D 307-30). Copy of this may be obtained from above-mentioned Society, at 260 South Broad Street, Philadelphia, Pa.

A very comprehensive system for identifying pipe contents by means of color has been established by the American Standards Association, as a recommended American practice. This is issued under title, "Scheme for the Identification of Piping Systems" (A 13-1928) - sponsors, National Safety Council and American Society for Mechanical Engineers. Copy may be obtained from above-mentioned Society, located at 29 West 39th Street, New York City.

The Signal Section of the American Railway Association has set up a specification for signal glasses that has not as yet received final approval. The purpose of this specification is to define the minimum values of luminous transmission for signal glasses and the limits of chromaticity for signal colors produced by illuminant-glass combinations. This specification is issued under No. 69-35, copy of which may be obtained from the American Railway Association, Signal Section, 30 Vesey Street, New York City.

In addition to the above, several projects in color standardization of agricultural products have been successfully concluded as a result of work conducted by Miss Dorothy Nickerson, Color Technologist, U. S. Department of Agriculture, Bureau of Agricultural Economics, Washington, D. C.

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Sidney M. Newhall, Department of Psychology, Johns Hopkins University -

PSYCHOLOGY OF COLOR. David Katz, The World of Colour, 1935, pp. 300, Kegan Paul, Trench, Trubner and Co., Ltd., London. This edition is an English translation from the author's abridgment of his second German edition, Der Aufbau der Farbwelt, 1930. (The first edition is entitled Die Erscheinungsweisen der Farben und ihre Beeinflussung durch die Individuelle Erfahrung, 1911.)

"The studies reported in this book belong to the field of colour-perception, and it is our plan to pursue all the phenomena of visual perception which have anything to do with colour. Our concern....is with the purely psychological problems of colour".

The book contains nine parts, the headings of which are respectively as follows: "Modes of appearance of colour and the phenomenology of illumination". "Film colours". "Surface colours". "Transparent and translucent colours". "Light as space-determiner". "Colour-constancy and colour-contrast". "Measures of the perception of illumination". "Colour-constancy and the problem of development". "Theories of colour-constancy". There is also a brief German-English glossary and author and subject indicies.

This book provides a convenient summary, valuable for reference or orientation, of the work on color constancy and allied problems in this fascinating field. There are numerous points of interest for the colorimetrist, illuminating engineer and photographer, as well as for the psychologist.

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W. D. Appel, National Bureau of Standards -

FADING OF DYEINGS IN RADIATION OF DIFFERENT INTENSITIES. Am. Dyestuff Reptr. vol. 24, pp 306-311; June 3, 1935. Seven selected dyeings were exposed to the radiation of the glass-enclosed carbon-arc lamp at distances from the arc selected to give intensities at the sample equal to that in the Fade-Ometer and to 0.3, 0.1, and 0.02 of that intensity. The temperature of the air about the dyeings was maintained at 43° C and the relative humidity at either 75 or 31 percent. The change in spectral reflectance with time of exposure was determined.

The time of exposure required to produce a given amount of fading at intensity 0.1 may be anywhere from 10 times to only 2 times that required at intensity 1. Thus, the relative fastness to light of dyeings when exposed at one intensity, for example, that of noon sunlight, is not necessarily their relative fastness when exposed at another intensity, for example, that of the diffused daylight in a room.

The rate of fading of some dyeings is not affected by a change in the relative humidity of the surrounding atmosphere from 75 percent to 31 percent, but the rate of fading of others is retarded by a factor of 2.

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A. H. Taylor, Lighting Research Laboratory, General Electric Company -

SPECIAL DISTRIBUTION OF ENERGY IN COMMON ILLUMINANTS. Paper appearing in September, 1934 issue of General Electric Review, touching on classification of illuminants as to spectrum characteristics; energy distribution in Mazda light and in daylight; artificial daylight, and production of color with Tungsten lamps.

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George P. Kerr, Jr., Lighting Research Laboratory, General Electric Company -

DISCUSSION OF GLOSS DEFINITIONS proposed in News Letter No. 7, page 3.

In order to find an adequate definition for the term gloss, we must analyze closely the phenomena associated with the term. To avoid confusion our definitions must accurately describe the attributes to which they are applied, and must not include too many attributes.

Important factors in determining the general appearance of surfaces are specular reflection, diffuse reflection, and texture. Of these three factors, the psychological entity associated with the term gloss is dependent upon only the first two. Texture may influence our judgments of gloss, as may various other factors, but it will serve only to confuse if included in the attributes described by the term gloss. Judd's suggestion for procedure in defining gloss seems to me very good; however, it does not lead me to the same definitions.

The criteria for visual judgments of gloss are (1) brilliance of the light reflected from a surface and (2) the saturation of specular with respect to total reflection. From these criteria subjective gloss, that is, the psychological entity, may be defined as follows: Gloss is the general name for all sensations arising from the effect upon the human seeing mechanisms of the brilliance and specular saturation of light reflected from a surface. $\frac{R_s}{R_s + R_d}$

In comparing surfaces as to their ability to produce gloss, we are seldom interested in the exact sensations produced, but merely in the physical characteristics of the surfaces which produce gloss. We can consequently define gloss of a surface in an objective or physical sense, and in this way it may be measured by definite physical functions. As a definition I would suggest the following: The gloss of a surface is its power to reproduce the brilliance and relative distribution in space of the light incident upon it. These two physical characteristics of a surface may be different upon different physical conditions, but under any given set of conditions depend only upon the surfaces themselves, and therefore may be measured by physical entities. The power of a surface to reproduce brilliance is directly proportional to its power to reproduce on the retina the flux density of the light incident upon it. Psychologically this is the apparent reflectance of the surface. This factor depends upon (1) the absorption by the surface and (2) the effect of the surface upon the distribution in space of the light incident upon it and (3) the relative positions of the source of light, the surface and the eye retina with respect to each other. This apparent reflectance varies with these conditions, and thus varies the brilliance attribute of gloss with these conditions. Since the saturation attribute of gloss depends on the ratio of the flux density of light specularly reflected with respect to the surface to the complete flux density reaching the eye, it is necessary to divide the apparent reflectance of a surface into two parts, namely, the apparent specular reflectance of a surface, and the apparent diffuse reflectance. If we denote these by A sub s and A sub d respectively, then the brilliance of surface gloss is their sum, or B sub g equals A sub s plus A sub d. $B_g = A_s + A_d$

The power of a surface to reproduce distribution in space may be termed saturation, and if we denote gloss saturation by S sub g, then S sub g equals A sub s divided by (A sub s plus A sub d). Thus gloss of a surface is separated into two attributes, each correlating closely with its effect upon the corresponding psychological attributes. This definition is, then, sufficient in describing the physical power of surfaces to produce the psychological phenomenon of gloss.

Now the gloss attributes of a surface vary with the conditions under which the surface is viewed. A sub s and A sub d vary with angle of incidence. Furthermore the distribution of incident light affects that of reflected light, and gives different values for A sub s and A sub d depending upon how these reflectances are measured. Therefore, it seems advisable to standardize conditions for measuring gloss of surfaces. Ideal conditions would include parallel incident light, 45° angles of incidence and regard, and perfectly plane surfaces to measure. However, the conditions for measurement depend upon the application of the results, and upon the instruments available for measurement, and cannot for this reason be standardized too rigidly. To avoid confusion all conditions should be specified in citing measurements of gloss attributes of surfaces.

If the above definitions are to be accepted, the term "objective gloss" or "polish" described by the committee is not a gloss attribute, and logically not, for A sub s divided by (A sub s (Perfect)) does not determine any appearance attribute of a surface. A measurement of "polish" is very important in industry for determining degree of efficiency in producing specular reflection, but this should not be identified with gloss.

Image reproducibility is one effect upon seeing of the saturation attribute of gloss. Its measurement is of value as a measurement of the psychological result of a physical entity, and image reproducibility is a psychophysical phenomenon. It does not determine the appearance of surfaces, but is an effect of the saturation attribute of psychological gloss, and serves as an accurate measure of this only if image reproducibility is the one effect considered.

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L. A. Jones, Research Laboratory, Eastman Kodak Company -

DISCUSSION OF GLOSS DEFINITIONS proposed in News Letter No. 7, page 3.

The subject of surface quality is one which has occupied the attention of this laboratory for a number of years. In any study of the surface quality it becomes at once evident that the quality is dependent, among other factors, upon three major ones which are: color, texture, and gloss. We shall pass over the first two and come immediately to the question of gloss which in general depends upon the geometrical distribution of light reflected from the surface of the sample, part of this light being reflected diffusely and part specularly.

Since the above definition of gloss is objective and applies to the stimulus we would propose, as originally suggested in a paper by Jones, on the gloss characteristics of photographic papers, the word "glossiness" as the term to be applied to the subjective impression of gloss. In investigating the relation between the objective and subjective aspects of the factor under discussion, we have found that expressing the subjective term or glossiness as

This is not subjective MA

the logarithm of the ratio of specular to diffuse reflection gives a numerical factor which is most nearly in accord with the actual visual impression produced by a series of surfaces, the gloss of which varies by measurable amounts. We therefore propose that glossiness be defined as the logarithm of the ratio between the specular and diffuse reflection from the surface of the sample in question, the defining equation to be:

Glossiness (G sub s) equals log G equals log
(B sub s divided by B sub d)

For the reasons stated above we feel that the definition of gloss suggested in your News Letter No. 7, last paragraph, page 4, specifies objective gloss rather than subjective.

The second factor which has been designated as "polish" merely compares the surface of the sample to one assumed as having a perfectly specular surface, and such a definition, we feel, does not properly define the factor under discussion.

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All notices, abstracts, and requests for further information regarding any of the items appearing in this letter, should be addressed to M. Rea Paul, 105 York Street, Brooklyn, N. Y.

September 5, 1935.