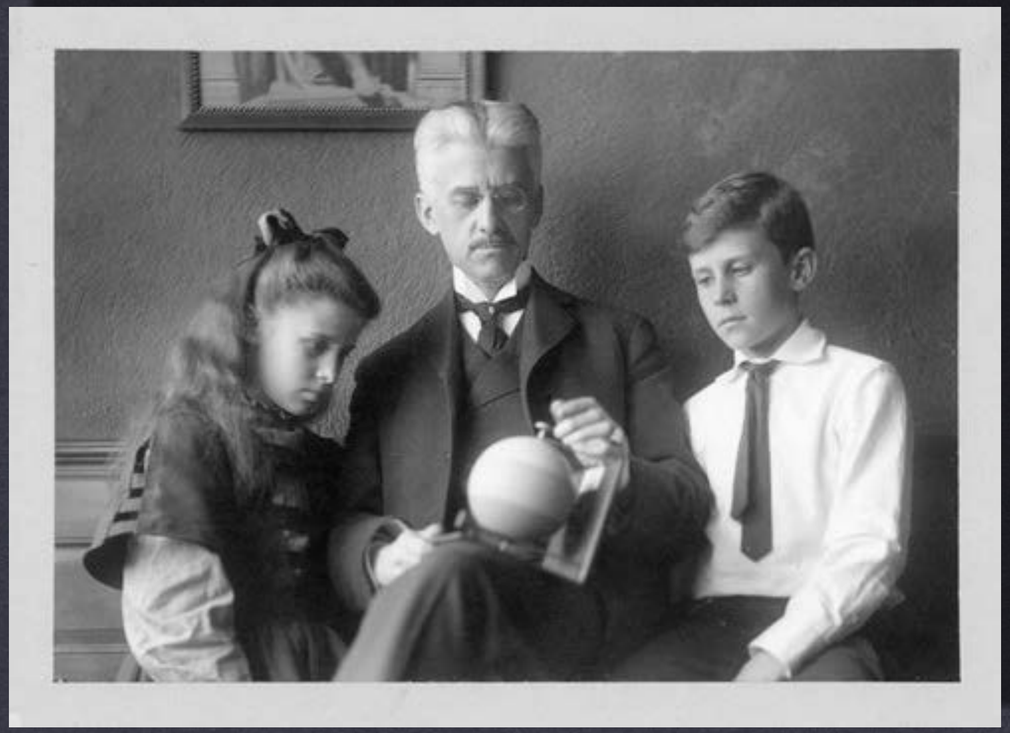

DEVELOPMENT OF THE MUNSELL COLOR ORDER SYSTEM

ROY S. BERNS
PROGRAM OF COLOR SCIENCE, MUNSELL COLOR SCIENCE LABORATORY,
ROCHESTER INSTITUTE OF TECHNOLOGY

Science + Math

PROGRAM OF COLOR SCIENCE

The Diaries of Albert H. Munsell

A unique insight into his life's work

PoCS MCSL

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Mark Fairchild
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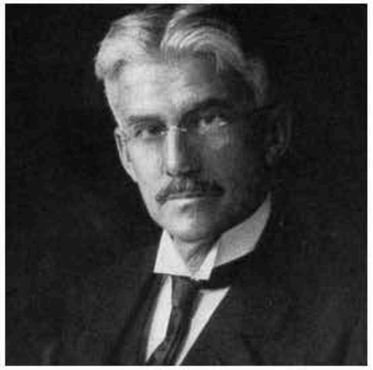
We are pleased to make these diaries available online. The links at left are individual PDFs, each in the range of 0.5 to 1MB. They represent all of volumes A and B in approximately twenty page increments. The index pages list the names of people mentioned in the diaries. Sorry, but there is no subject index. If you would like to create one, we will gladly publish it here!



Professor A.H. Munsell

Note that some PDFs are actually more than 20 pages. We grouped the tiles by the page number in the typed copies. Many pages were inserted with letter notation (4a, 4b, 4c, etc). Also, some of the handwritten pages are unnumbered. You may want to download the document before or after to make sure you get the desired pages.

Original cover sheet

Below is the text from the cover sheet in the diary binders as received. It was slightly edited for typographical errors. Links to PDFs of individual chapters are at right.

The diary hereby made available is one kept by A. H. Munsell during the years in which he was developing both the Munsell color system and apparatus and charts by which to explain it.

A typewritten copy was made at the Munsell Color Company in the years 1920-23 from 6 volumes of a handwritten diary kept by Professor Munsell. Drawings and sketches were all hand-traced, and handwriting was inserted where corrections or additions were made in

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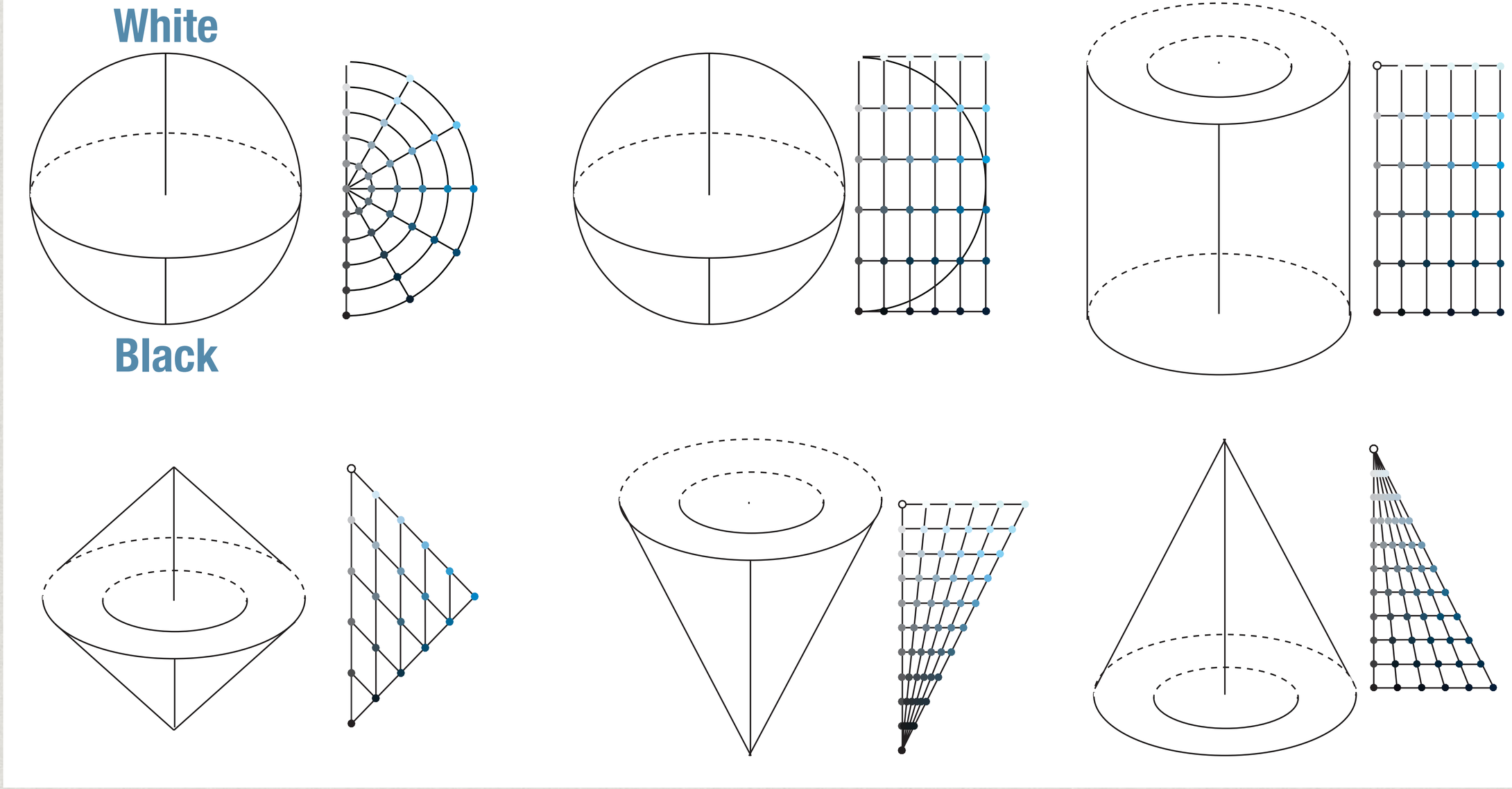
“IT MAY SOUND STRANGE TO SAY THAT COLOR HAS THREE DIMENSIONS, BUT IT IS EASILY PROVED BY THE FACT THAT EACH OF THEM CAN BE MEASURED.”

Albert H. Munsell
A Color Notation
p. 10

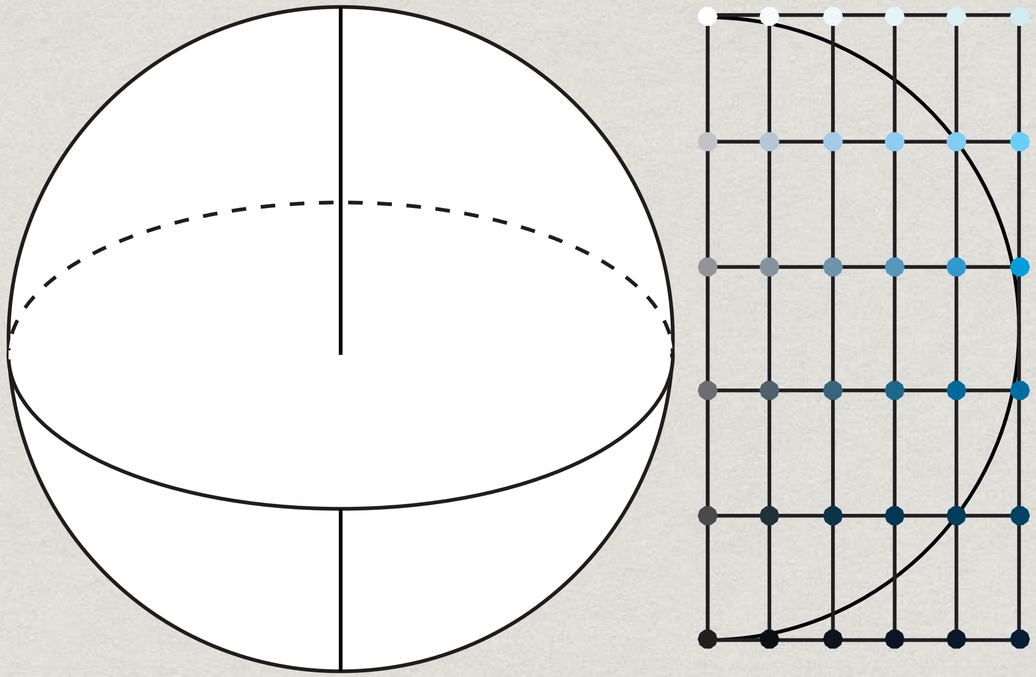
“IT MAY SOUND STRANGE TO SAY THAT COLOR HAS THREE DIMENSIONS, BUT IT IS EASILY PROVED BY THE FACT THAT EACH OF THEM CAN BE MEASURED.”

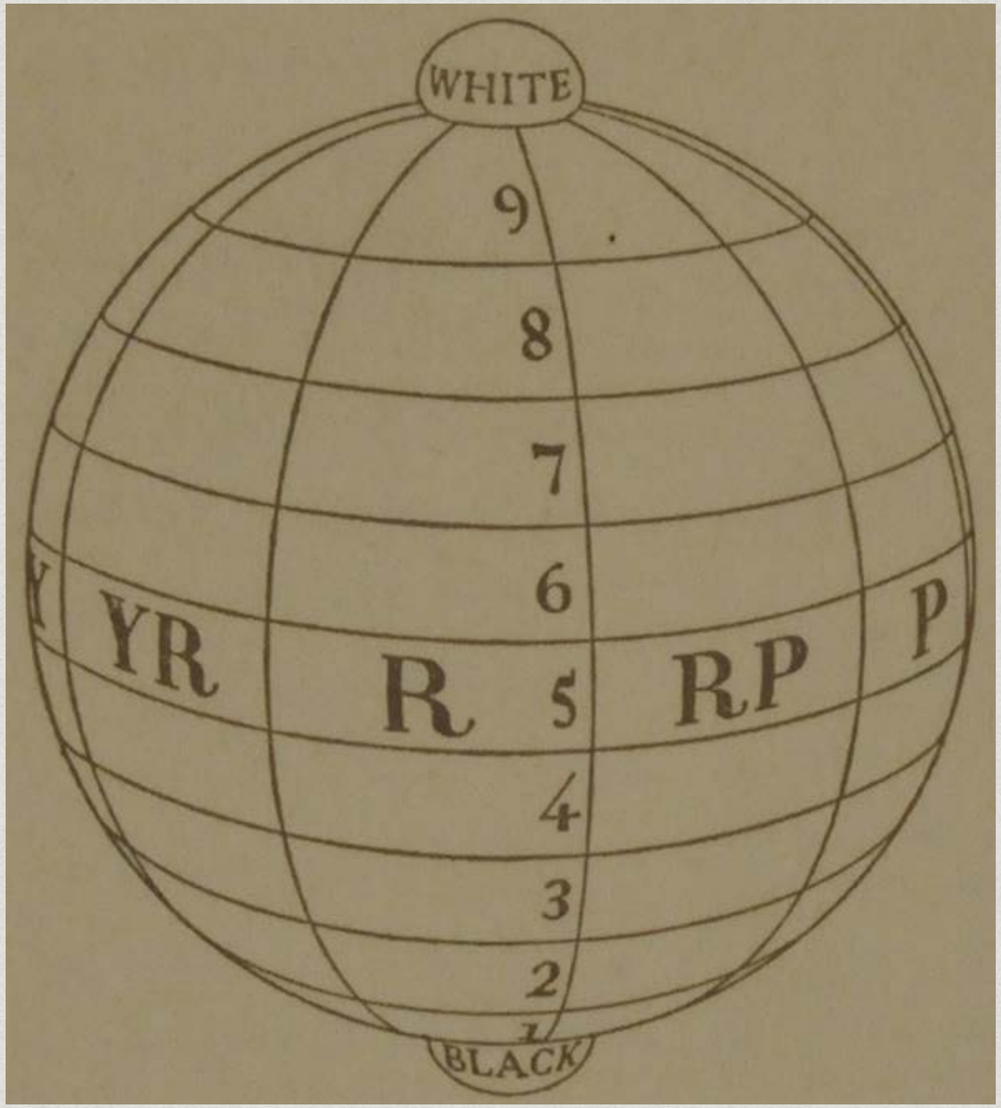
Albert H. Munsell
A Color Notation
p. 10

Organizing Color in Three Dimensions



Munsell's Preferred 3-D Organization: The Sphere



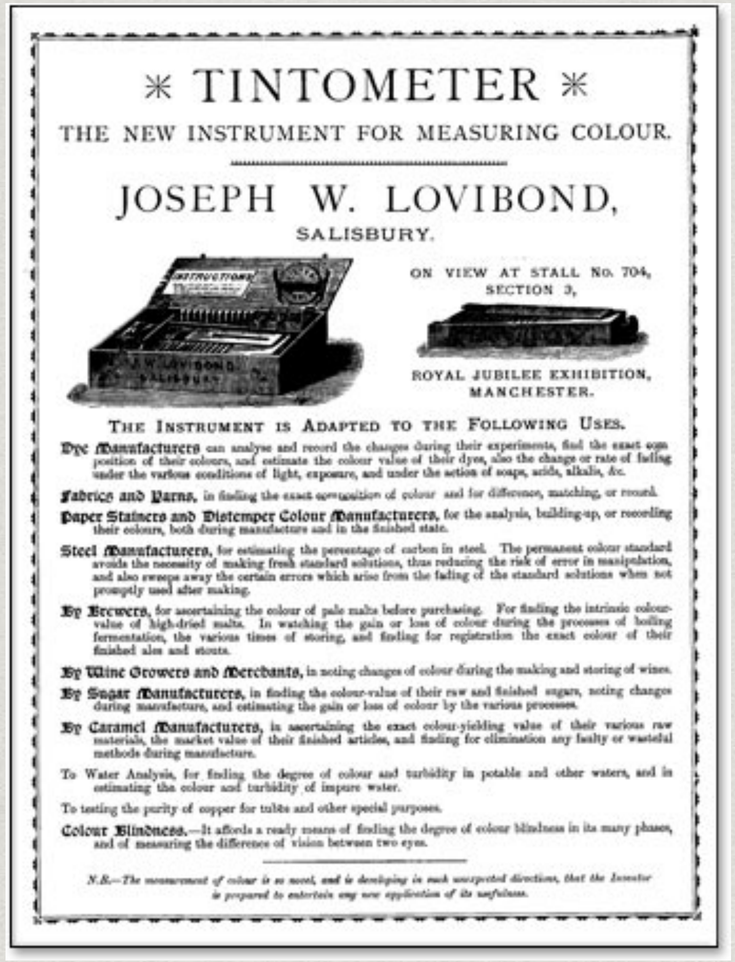


Possible Uses of a Revolving Spherical Color Chart

- Educational – to present the relations of colors.
- Record – to preserve and reproduce any color group or effect.
- Apparatus – for mergence and predominance of hues in any sequence.
- Key-board – or instrument for color arrangements.

Munsell's Diary June 2, 1899

Influences: Lovibond Tintometer, 1885



✳ TINTOMETER ✳

THE NEW INSTRUMENT FOR MEASURING COLOUR.

JOSEPH W. LOVIBOND,

SALISBURY.

ON VIEW AT STALL No. 704, SECTION 3,

ROYAL JUBILEE EXHIBITION, MANCHESTER.

THE INSTRUMENT IS ADAPTED TO THE FOLLOWING USES.

Dye Manufacturers can analyse and record the changes during their experiments, find the exact composition of their colours, and estimate the colour value of their dyes, also the change or rate of fading under the various conditions of light, exposure, and under the action of soaps, acids, alkalis, &c.

Fabrics and Yarns, in finding the exact composition of colour and for difference, matching, or record.

Paper Stainers and Distemper Colour Manufacturers, for the analysis, building-up, or recording their colours, both during manufacture and in the finished state.

Steel Manufacturers, for estimating the percentage of carbon in steel. The permanent colour standard avoids the necessity of making fresh standard solutions, thus reducing the risk of error in manipulation, and also sweeps away the certain errors which arise from the fading of the standard solutions when not promptly used after making.

By Brewers, for ascertaining the colour of pale malts before purchasing. For finding the intrinsic colour-value of high-dried malts. In watching the gain or loss of colour during the processes of boiling fermentation, the various times of storing, and finding for registration the exact colour of their finished ales and stouts.

By Wine Growers and Merchants, in noting changes of colour during the making and storing of wines.

By Sugar Manufacturers, in finding the colour-value of their raw and finished sugars, noting changes during manufacture, and estimating the gain or loss of colour by the various processes.

By Caramel Manufacturers, in ascertaining the exact colour-yielding value of their various raw materials, the market value of their finished articles, and finding for elimination any faulty or wasteful methods during manufacture.

To Water Analysis, for finding the degree of colour and turbidity in potable and other waters, and in estimating the colour and turbidity of impure water.

To testing the purity of copper for tubes and other special purposes.

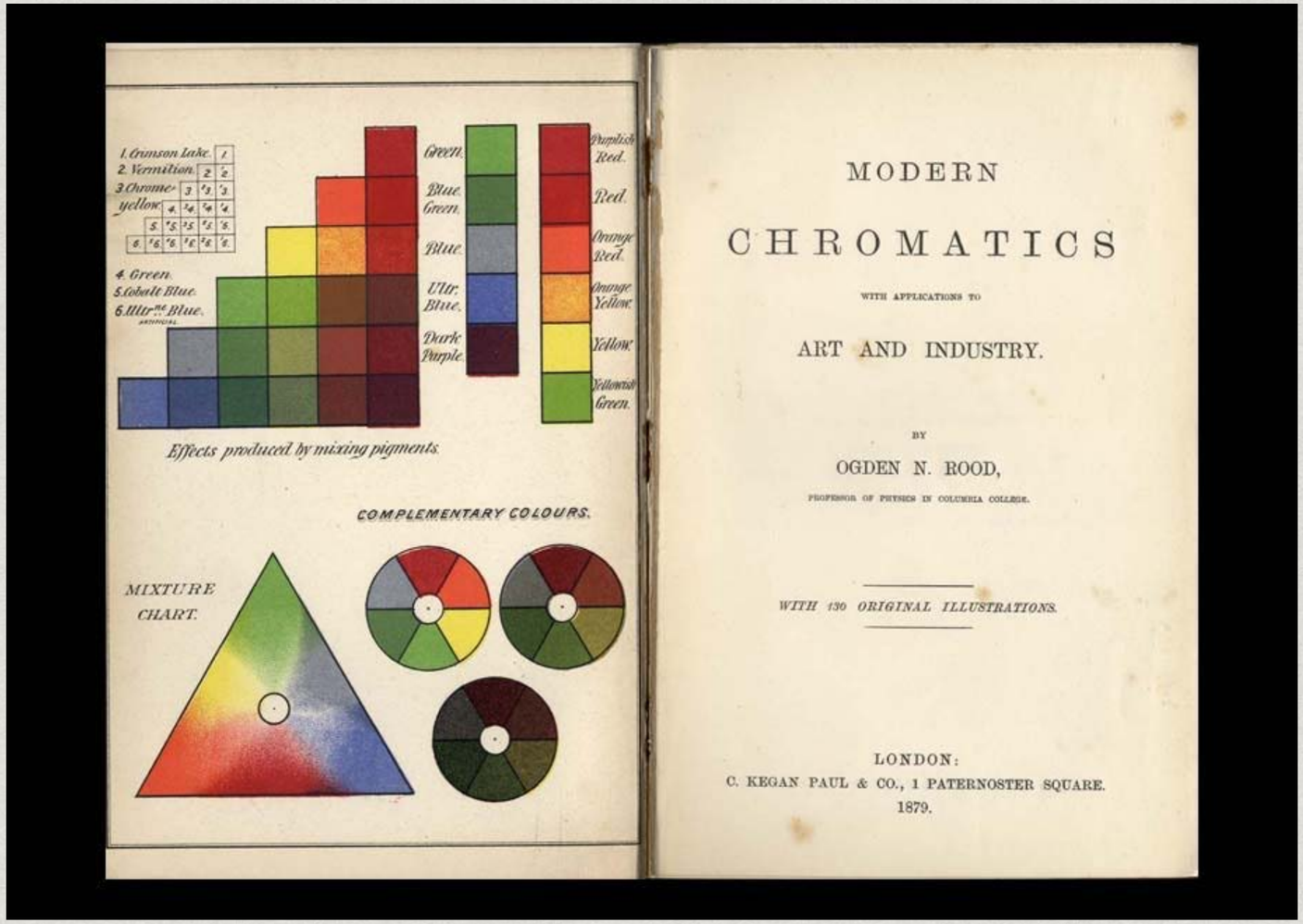
Colour Blindness.—It affords a ready means of finding the degree of colour blindness in its many phases, and of measuring the difference of vision between two eyes.

N.B.—The measurement of colour is so novel, and is developing in such unexpected directions, that the Inventor is prepared to entertain any new application of its usefulness.

Influences: Base-10 Arithmetic

http://theleanleap.com/2015/06/10-lean-six-sigma-sayings/

Influences: Professor Ogden Rood, Chair of Physics, Columbia University



First Entry in Munsell's Diary

1879 Studied Rood's Modern Chromatics.
Made twirling model of two triangular
pyramids - fastened base to base - while
studying descriptive geometry in class C
(N. A. S.) and placed red, green and vio-
let at angles.
(vermillion - emerald green- ult. blue)

1887 Reviewed Chevreul - at Beaux-Arts Library -
and visited Gobelins - to see scale of
yarns -

Diary entries are typed

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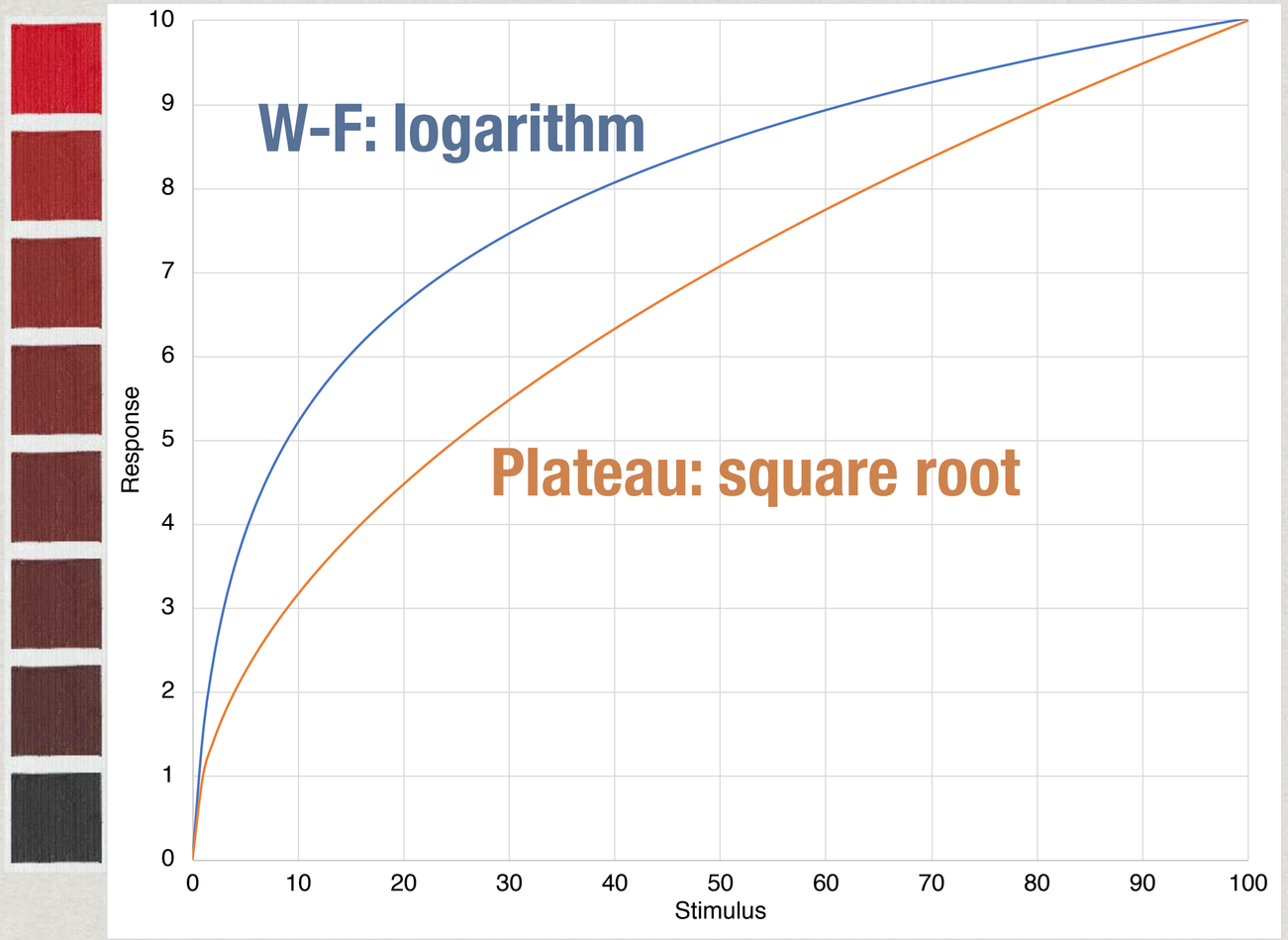
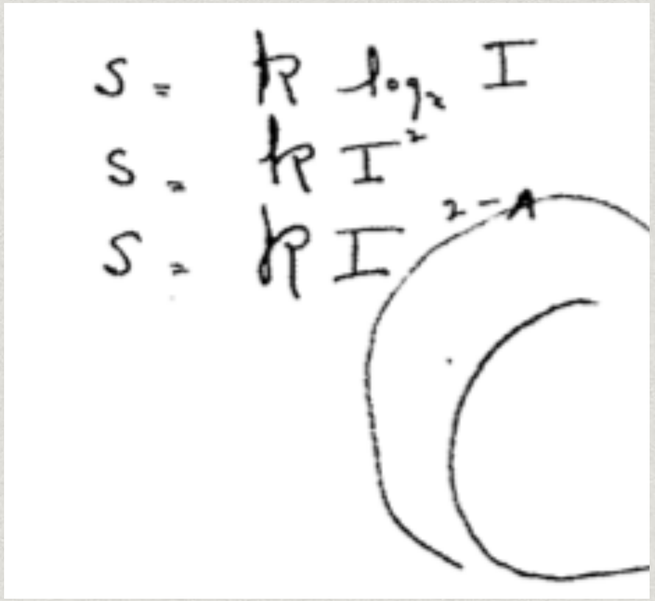
Influences: Weber, Fechner, Plateau



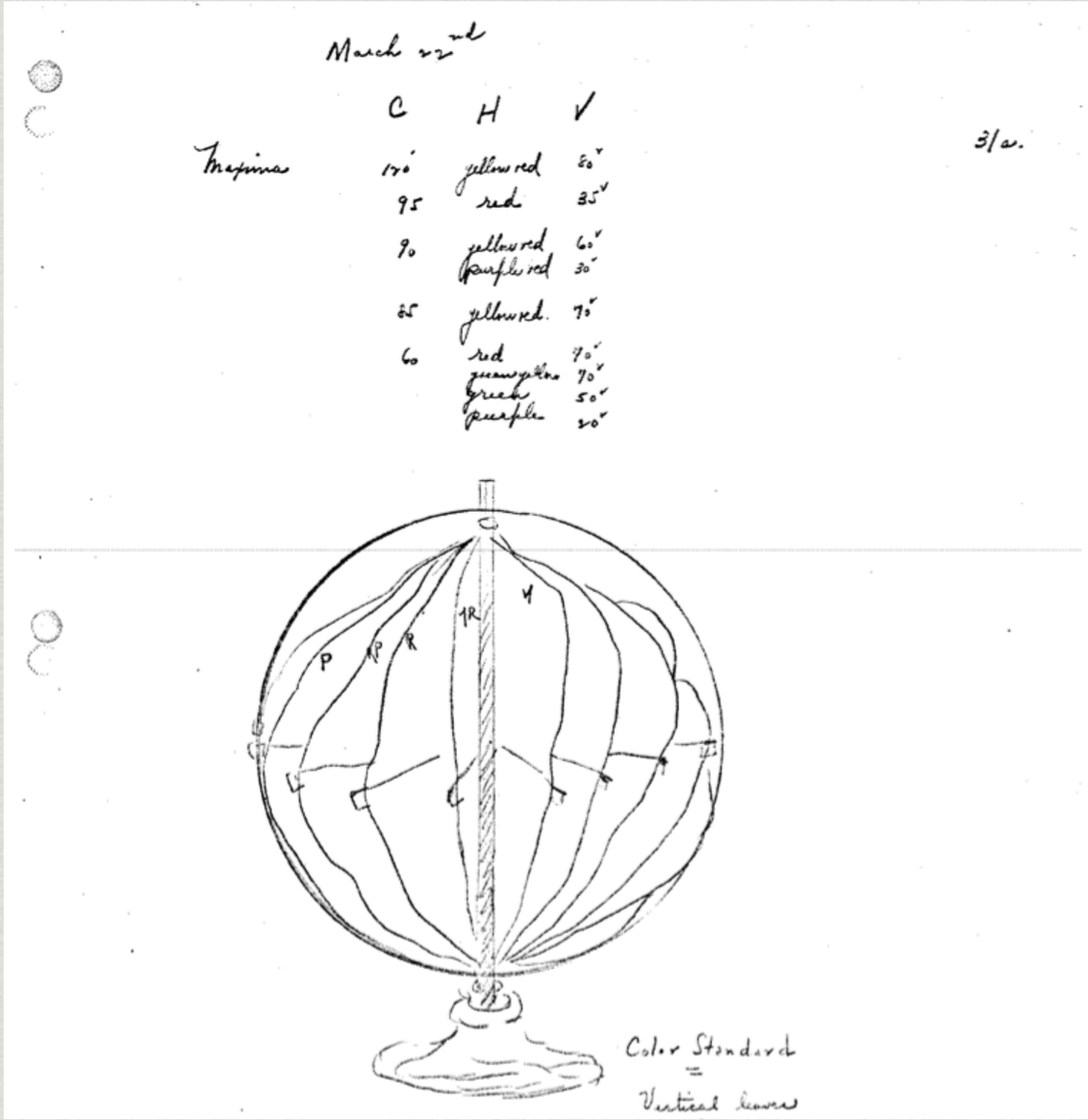


Munsell's Diary

Amount of Red
0, 10%, 20%,… 100%

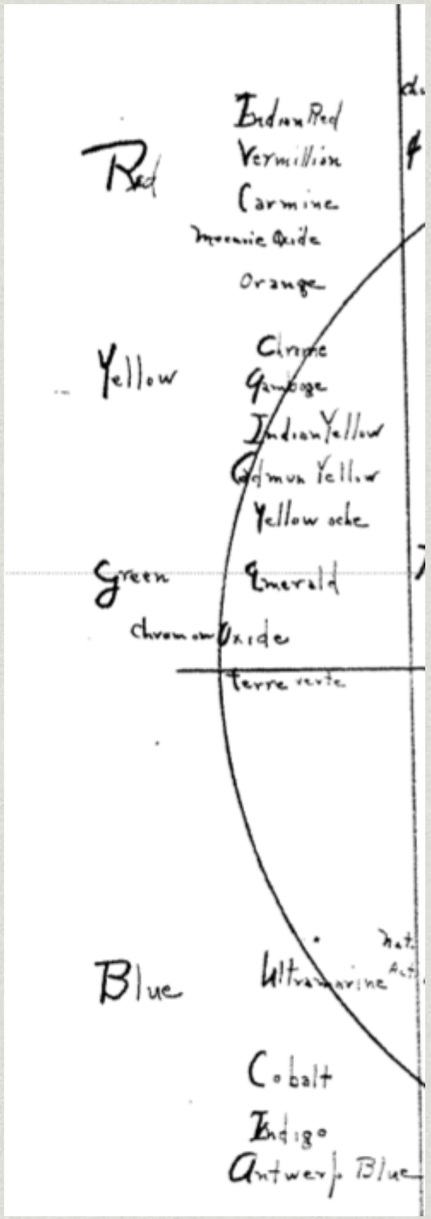
Organizing Color in Three Dimensions

Middle Gray in the Center of Sphere



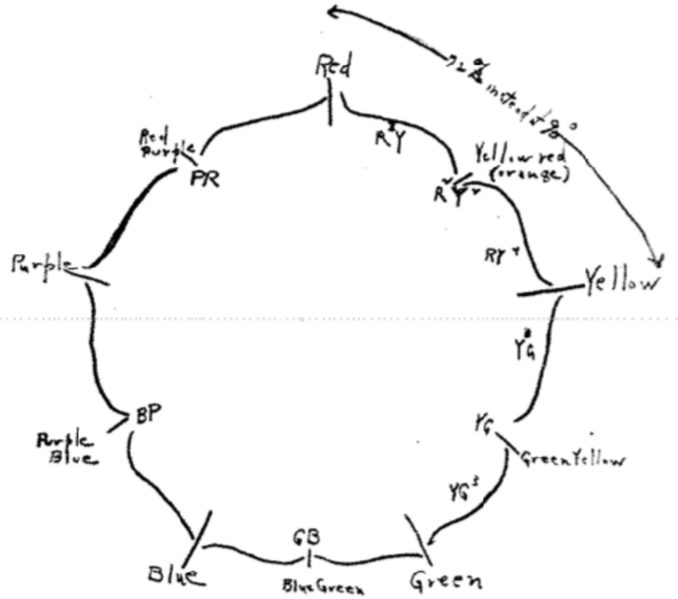
HUE DIMENSION

Hue



April 5

Attempted division by 5
in order to use decimal
system 100° from any color
to its complement -right
or left-handed
100° from black to white

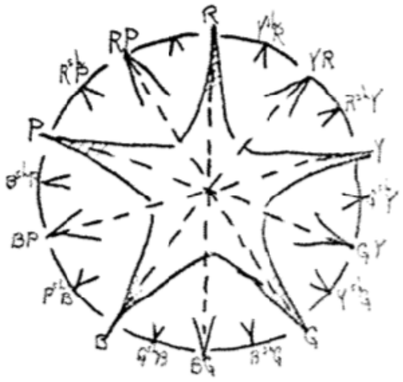


Centrals 1 word	Intermediates 2 words
Red	
	Purplish red
	Red purple
	Reddish purple
Purple	
	Bluish purple
	Purple Blue (violet)
	Purplish Blue
Blue	
	Greenish Blue
	Blue Green
	Bluish Green
Green	
	Yellowish Green
	Green Yellow
	Greenish Yellow
Yellow	
	Reddish Yellow
	Yellow Red (orange)
	Yellowish Red

A Color Compass
of
20 points

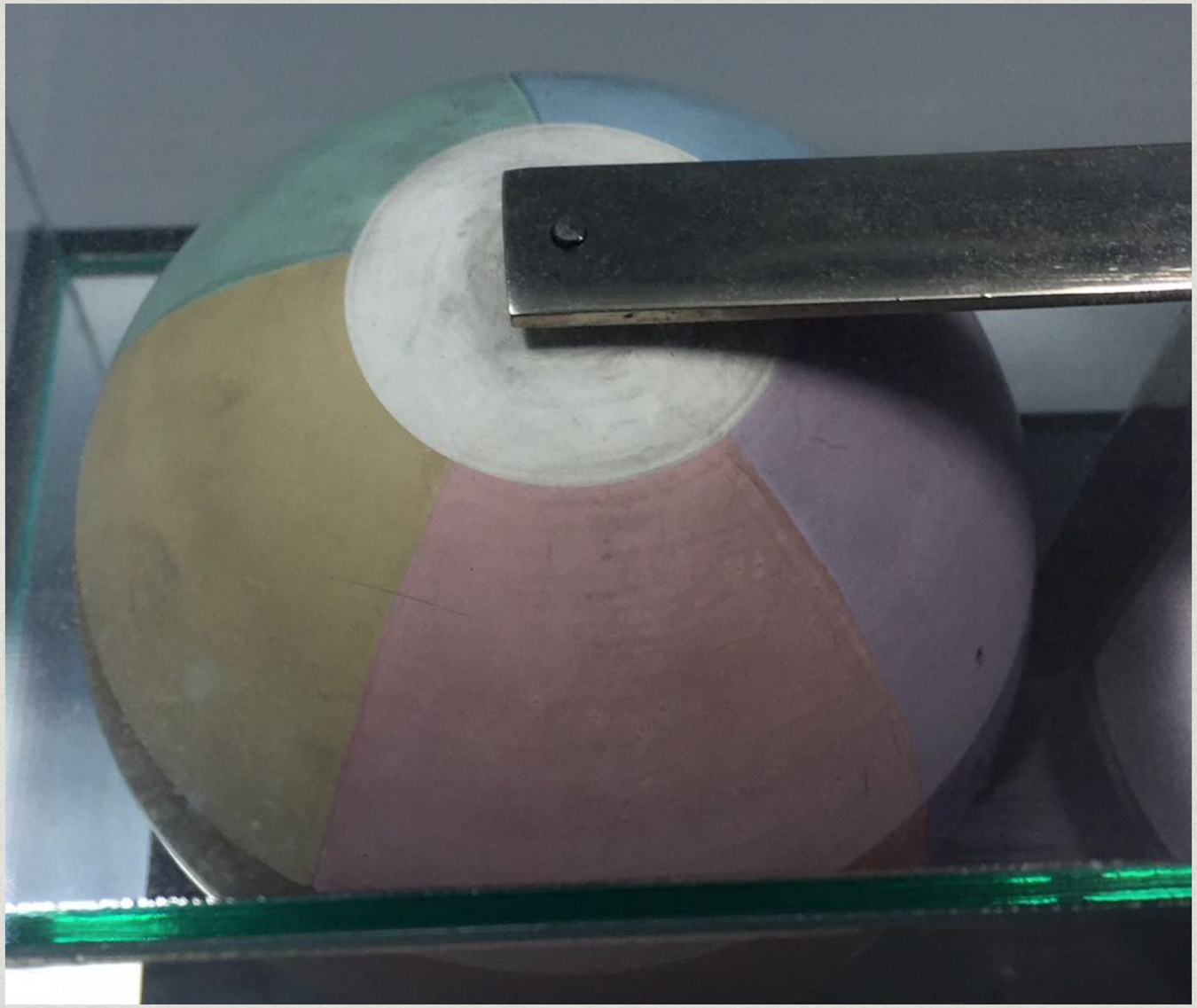
(10 to right
of red
10 to left
of red)

Each 10% of
Hue

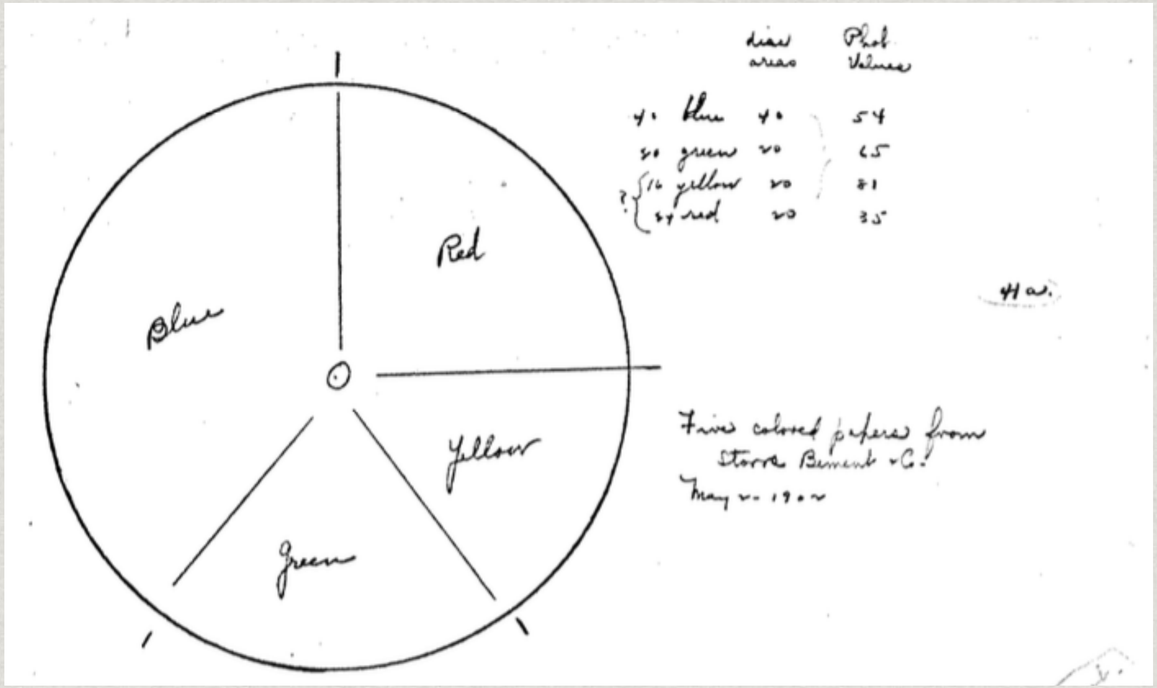


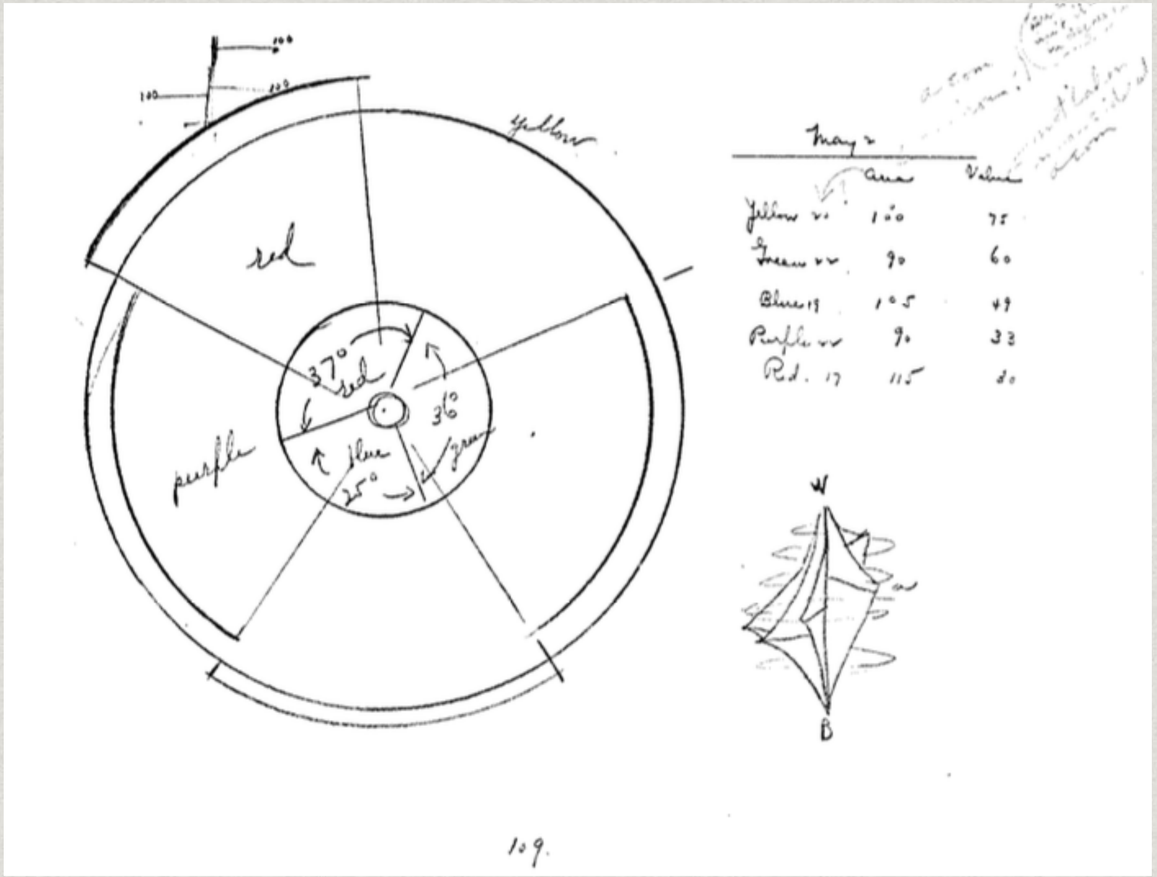
Because of two-word intermediates, no orange

Specific Hues Spun to Make a Gray

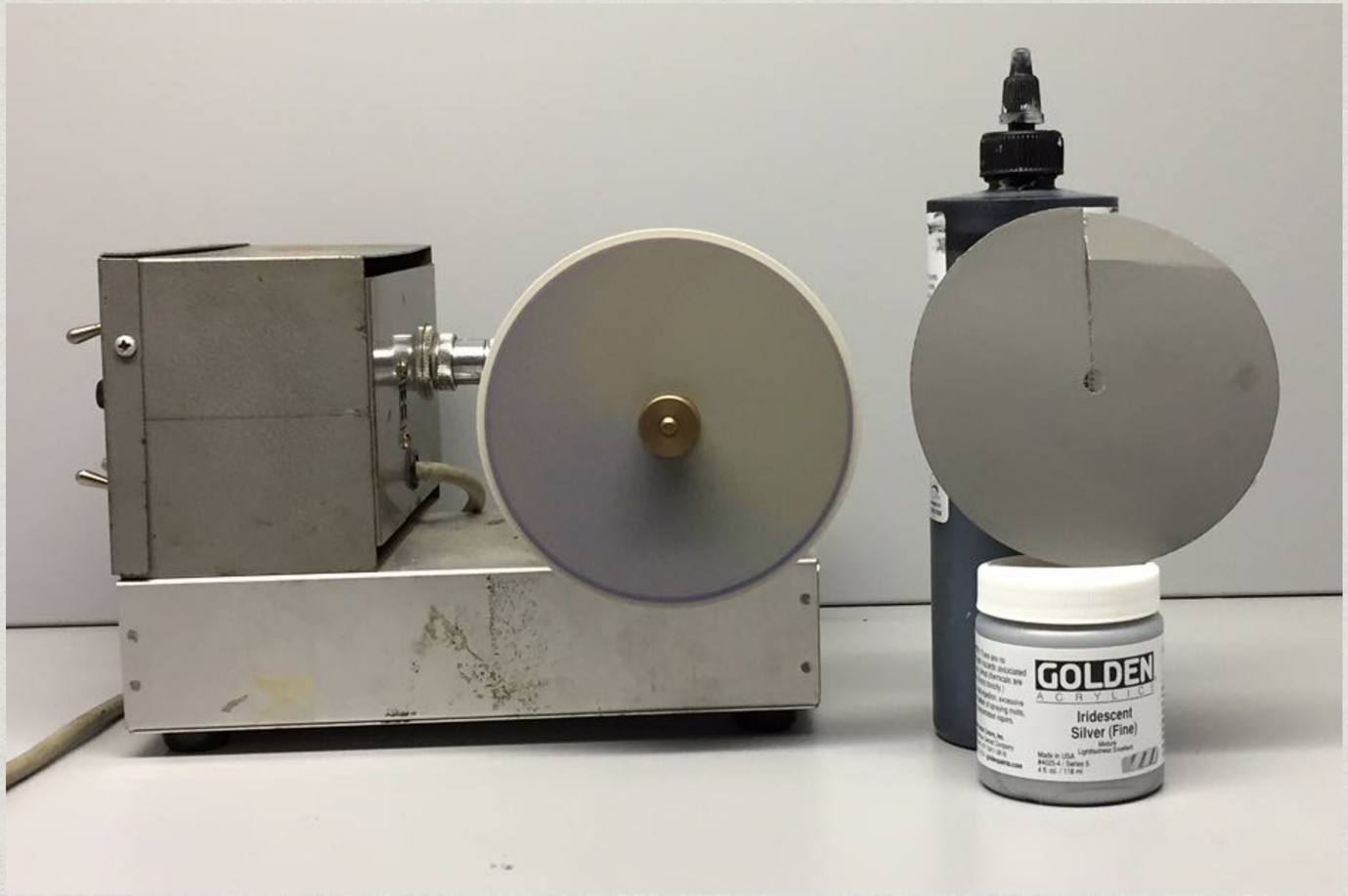


What About Hering and Four Elemental Colors: Red, Yellow, Green, and Blue?

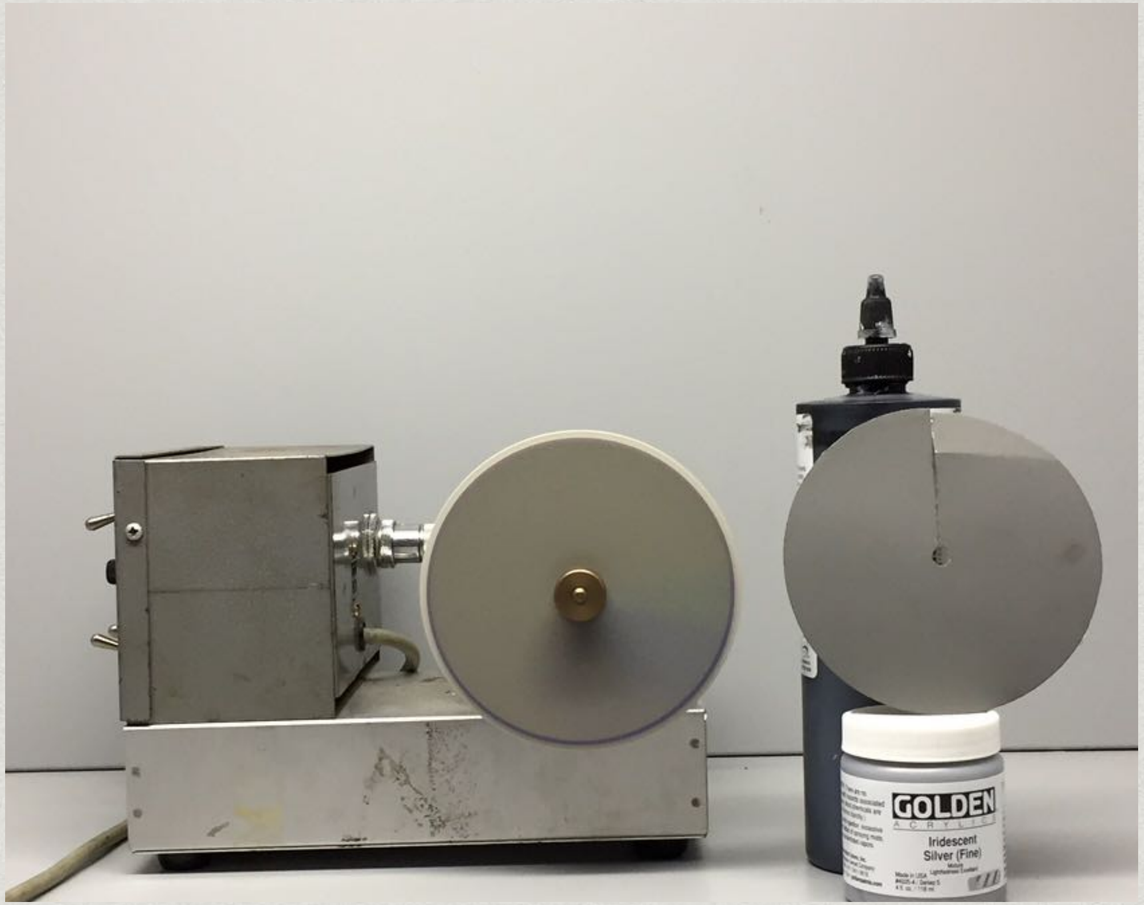


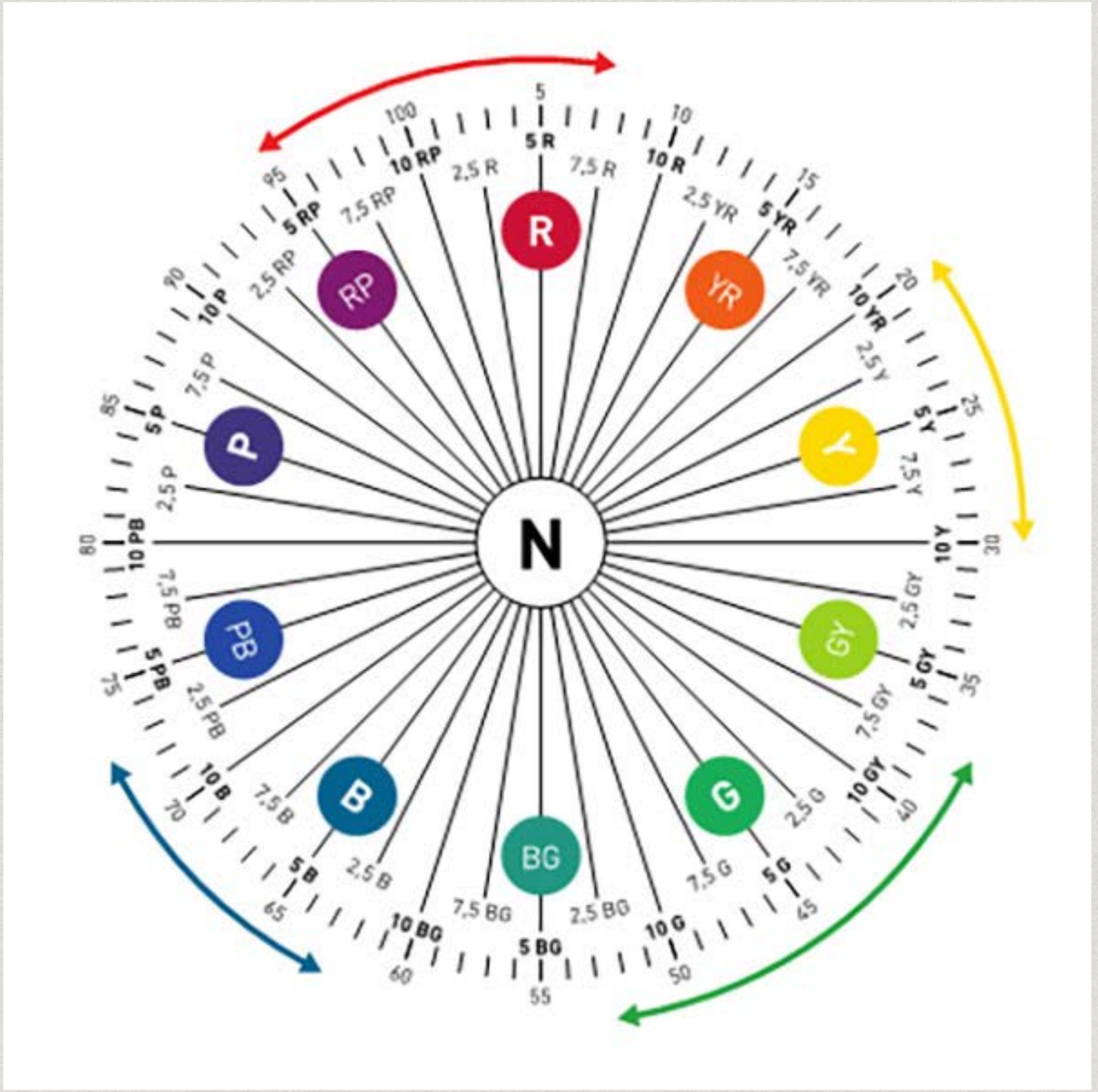


Spinning Disk: Red, Yellow, Green, Blue



Spinning Disk: Red, Yellow, Green, Blue, Purple




N
R
YR
Y
GY
G
BG
B
PB
P
RP
5 R
10 R
2.5 R
7.5 R
5 YR
10 YR
2.5 YR
7.5 YR
5 Y
10 Y
2.5 Y
7.5 Y
5 GY
10 GY
2.5 GY
7.5 GY
5 G
10 G
2.5 G
7.5 G
5 BG
10 BG
2.5 BG
7.5 BG
5 B
10 B
2.5 B
7.5 B
5 PB
10 PB
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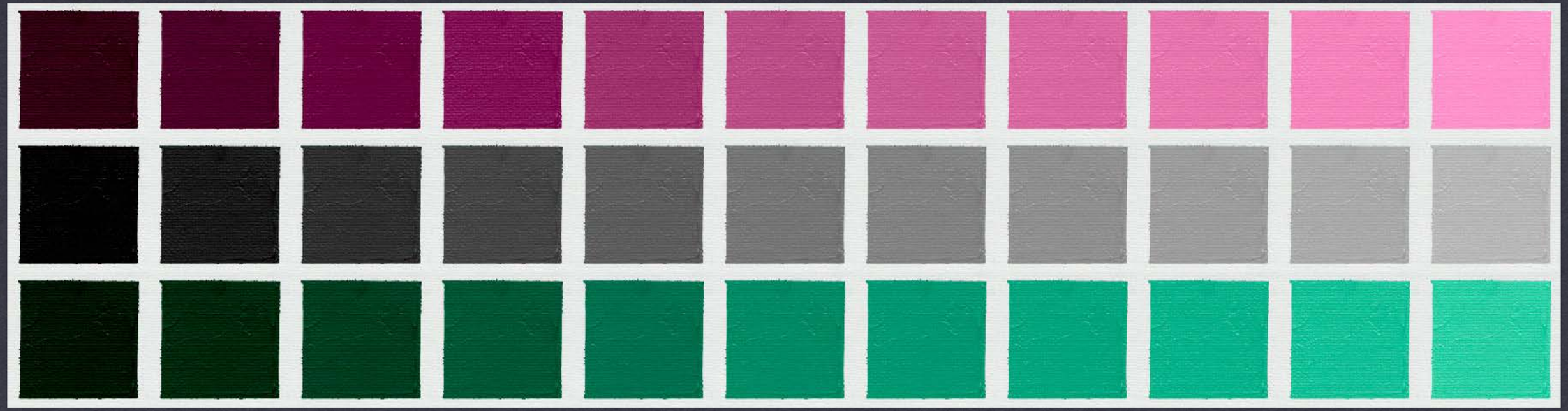
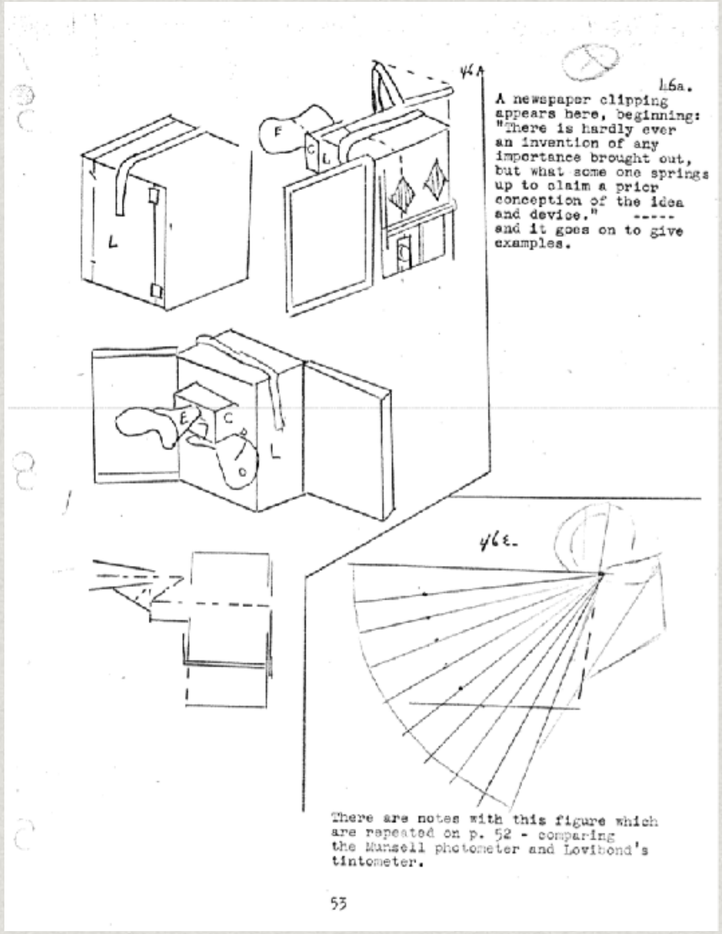
100

ACHROMATIC DIMENSION



Invented Portable Photometer, the Lumenometer



16a.

A newspaper clipping appears here, beginning: "There is hardly ever an invention of any importance brought out, but what some one springs up to claim a prior conception of the idea and device." ----- and it goes on to give examples.

There are notes with this figure which are repeated on p. 52 - comparing the Munsell photometer and Lovibond's tintometer.

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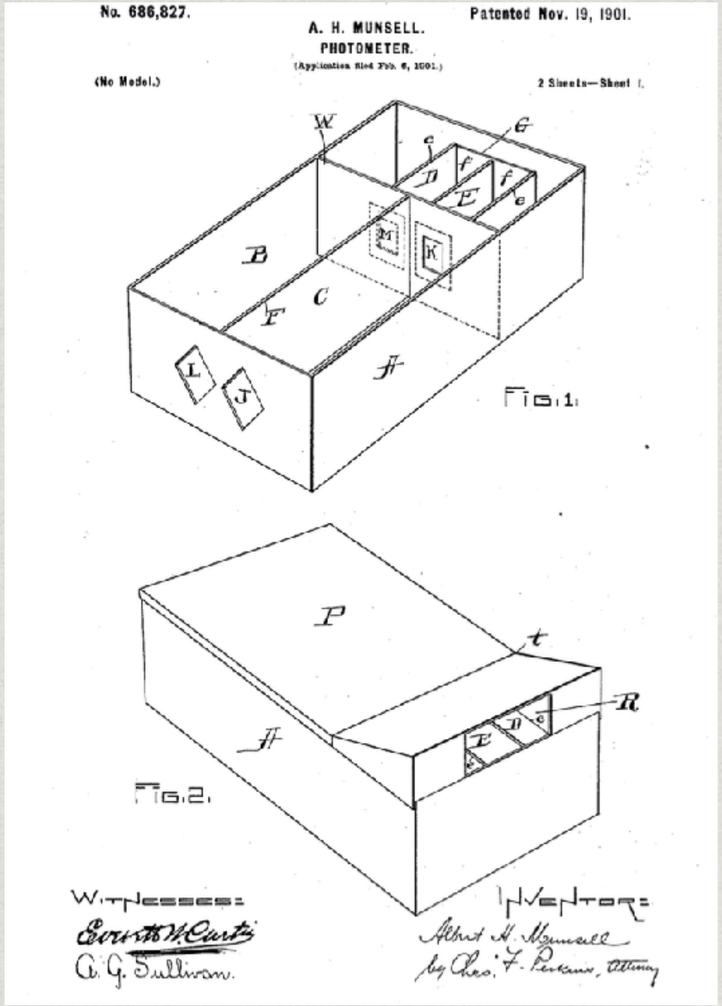

No. 686,827. Patented Nov. 19, 1901.

A. H. MUNSELL.

PHOTOMETER.

(Application filed Feb. 6, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

Fig. 2.

Witnesses: Edwin H. Curtis, A. G. Sullivan.

Inventor: Albert H. Munsell, by Chas. F. Perkins, Attorney.

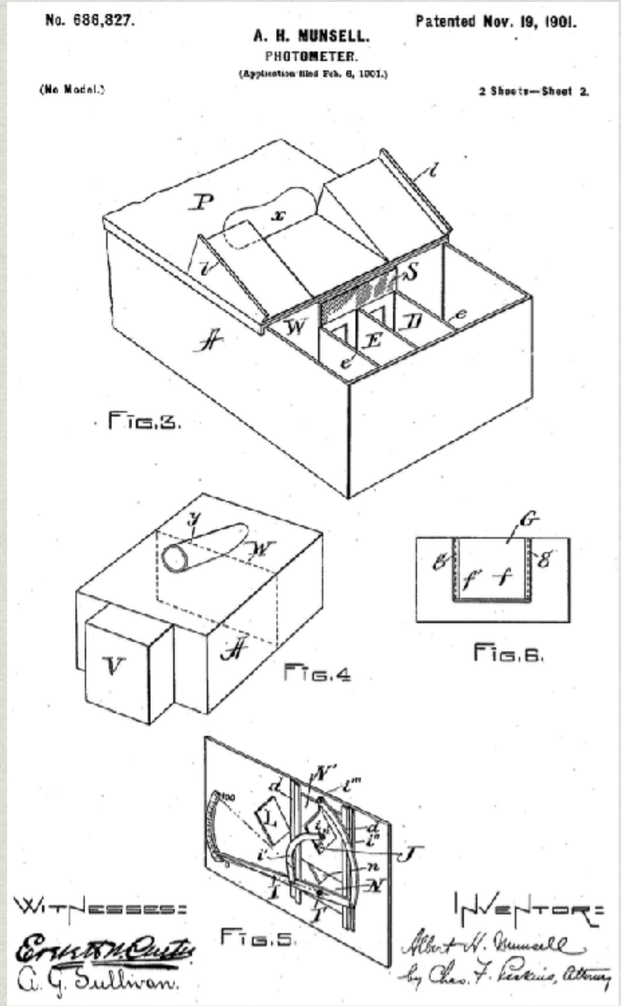

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Fig. 3.

Fig. 4.

Fig. 6.

Fig. 5.

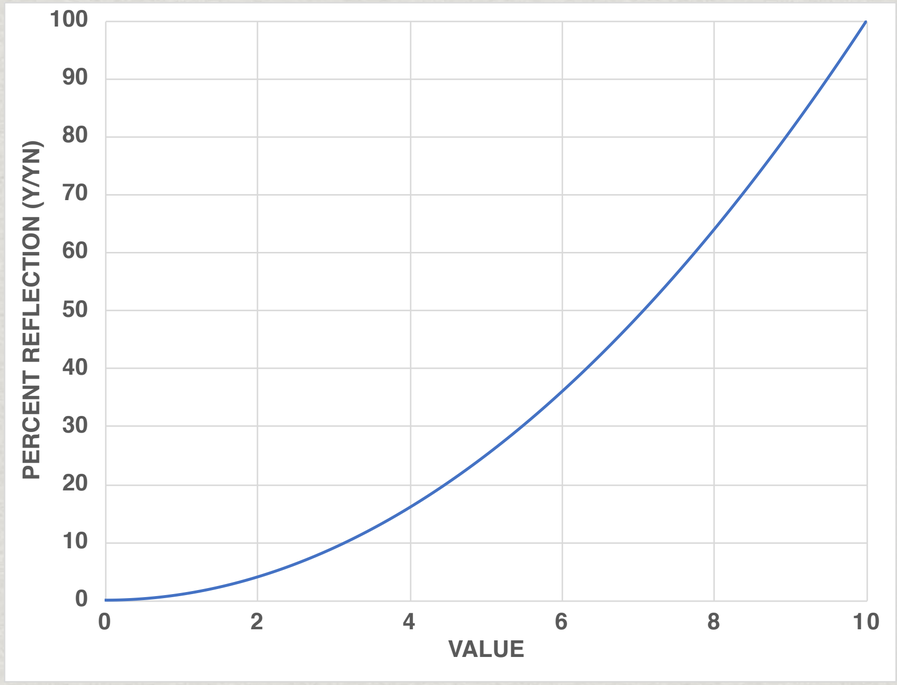
Witnesses: Edwin H. Curtis, A. G. Sullivan.

Inventor: Albert H. Munsell, by Chas. F. Perkins, Attorney.

US Patent 686827A 1901

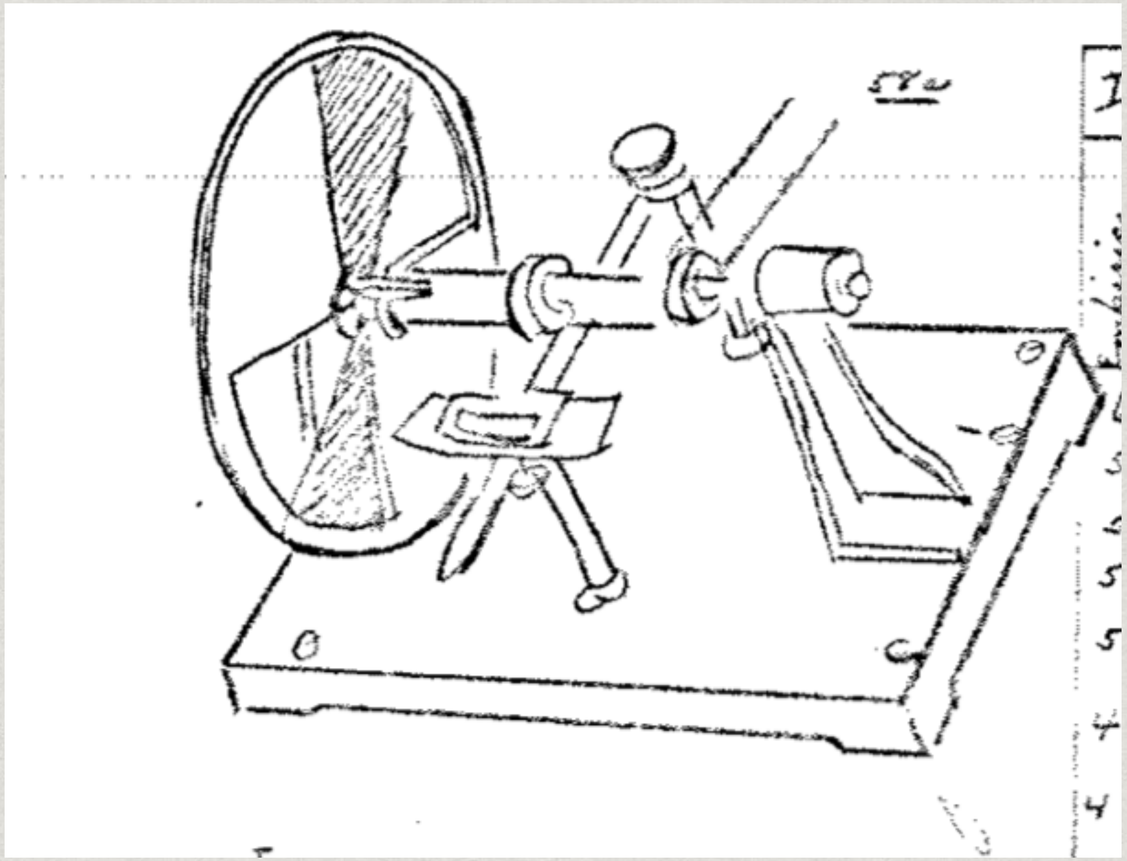
Value: Measurement Based

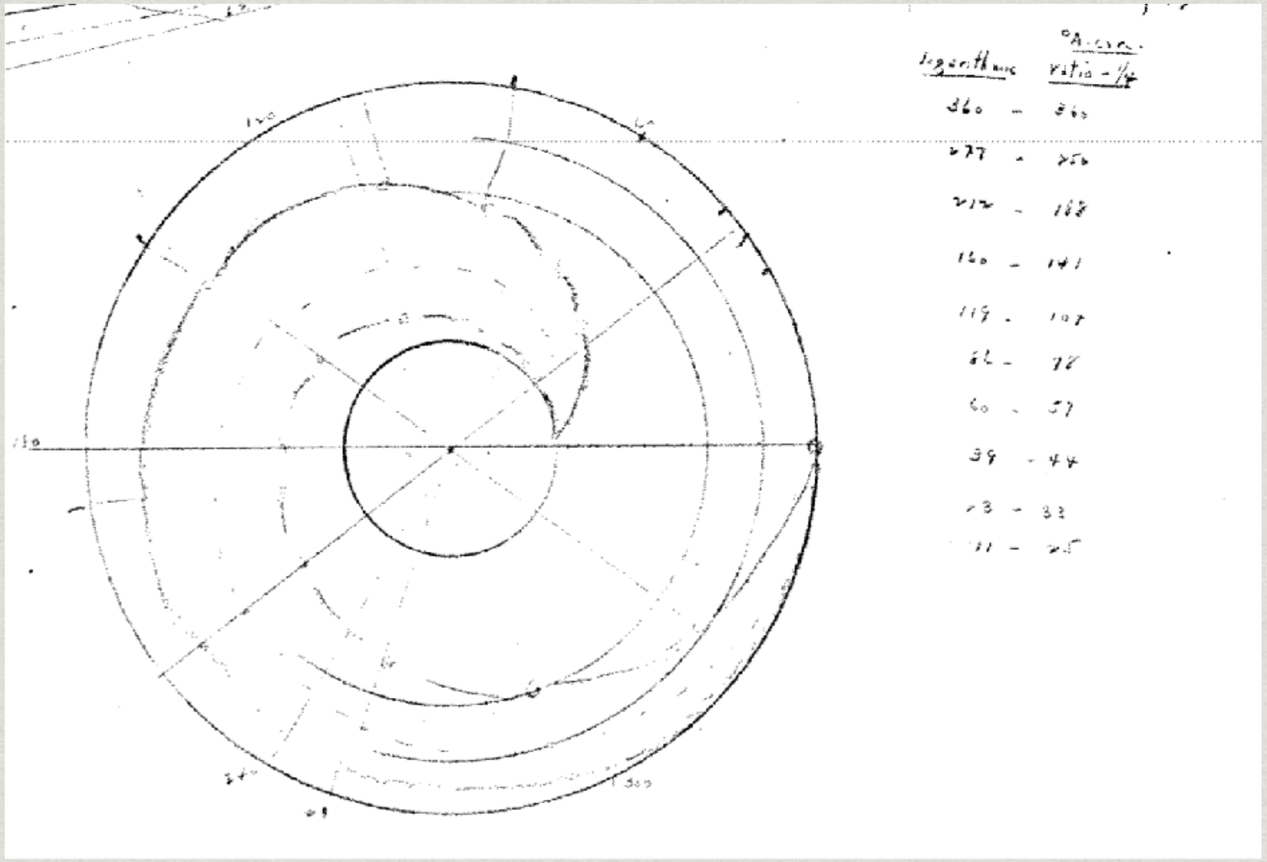
- Photometer used to measure %R (weighted by an observer's luminous efficiency function
- Used Plateau's psychometric function



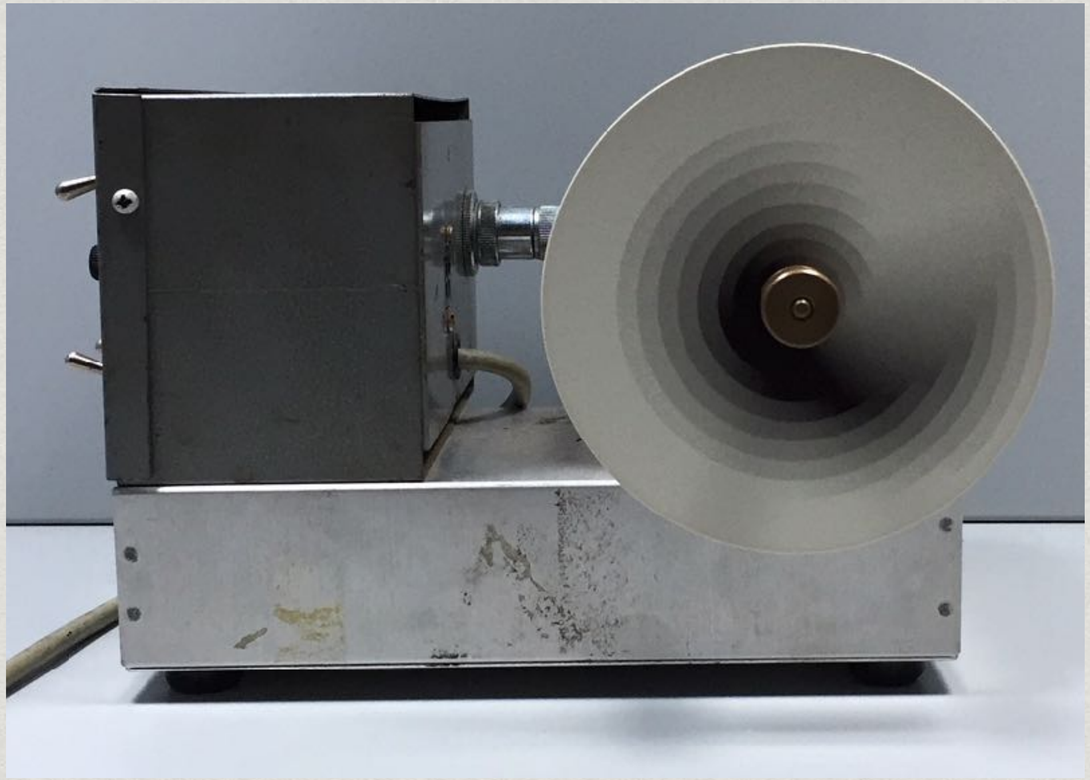
Value	%
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81

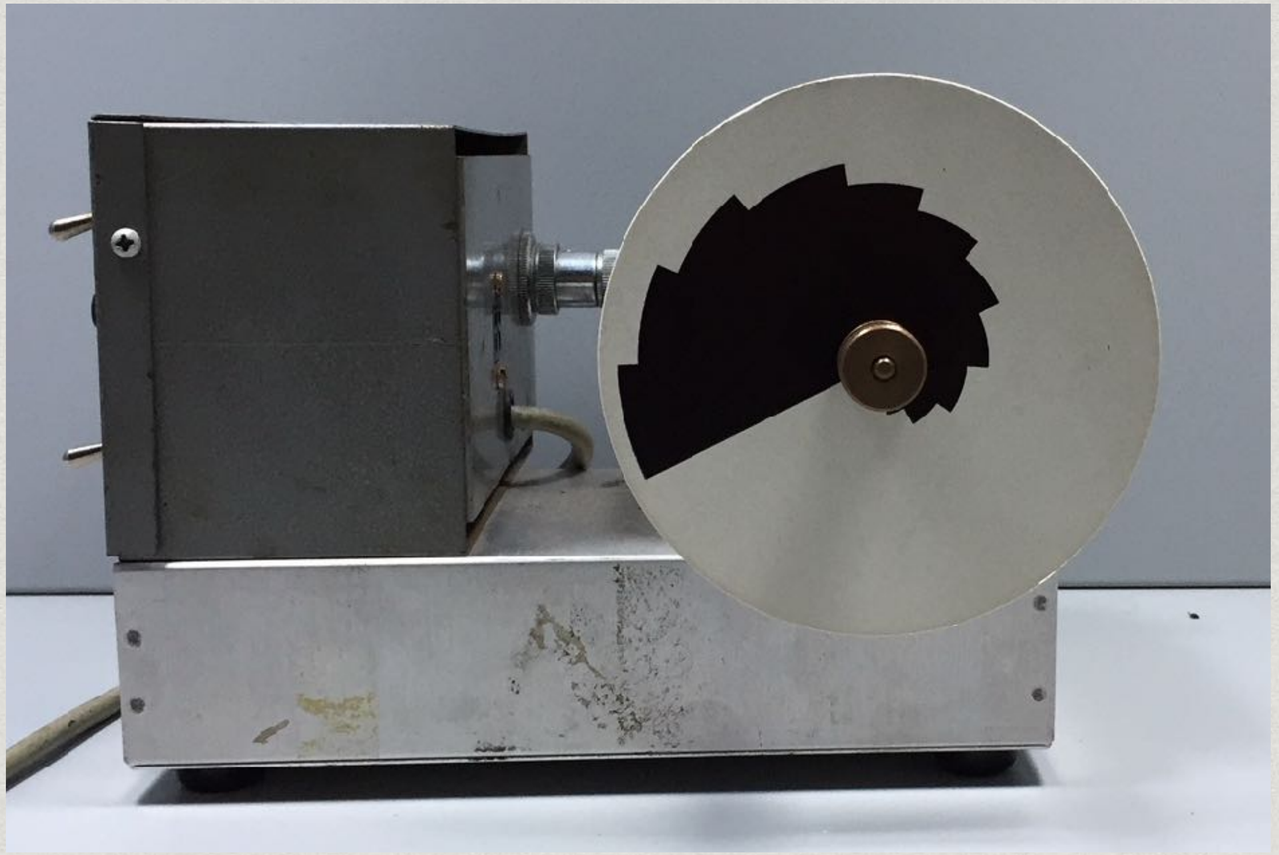
Replacing Photometer with Spinning Disk





Fechner’s Law

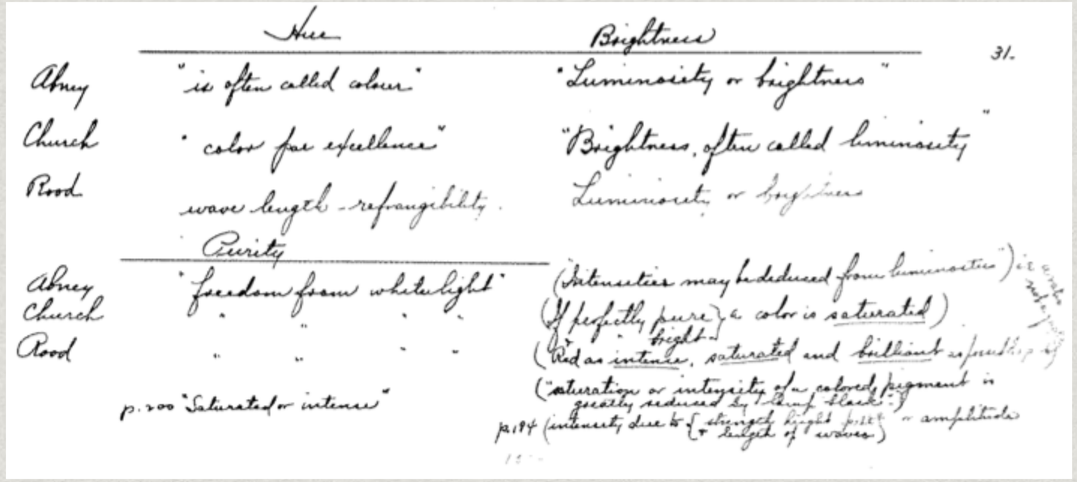


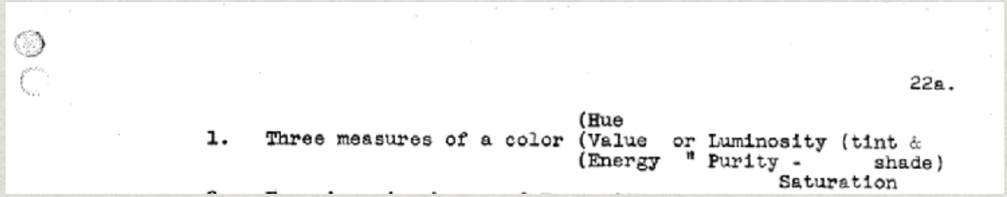


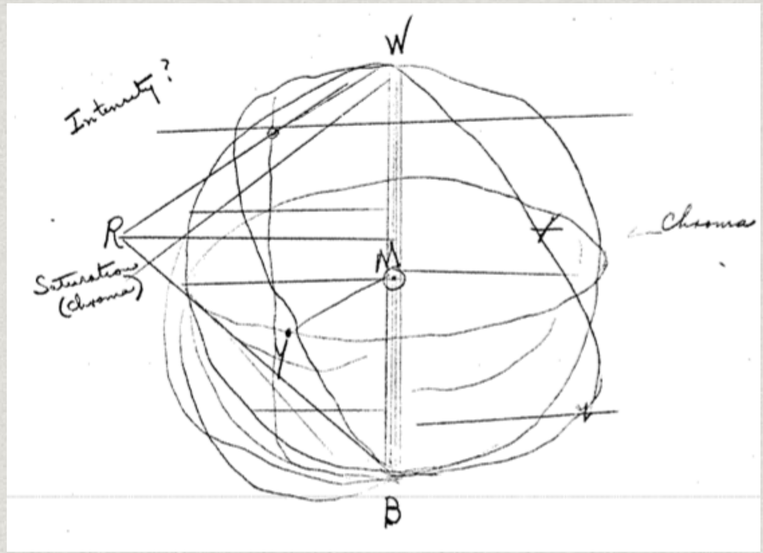
CHROMATIC INTENSITY DIMENSION

Terminology for Chromatic Intensity

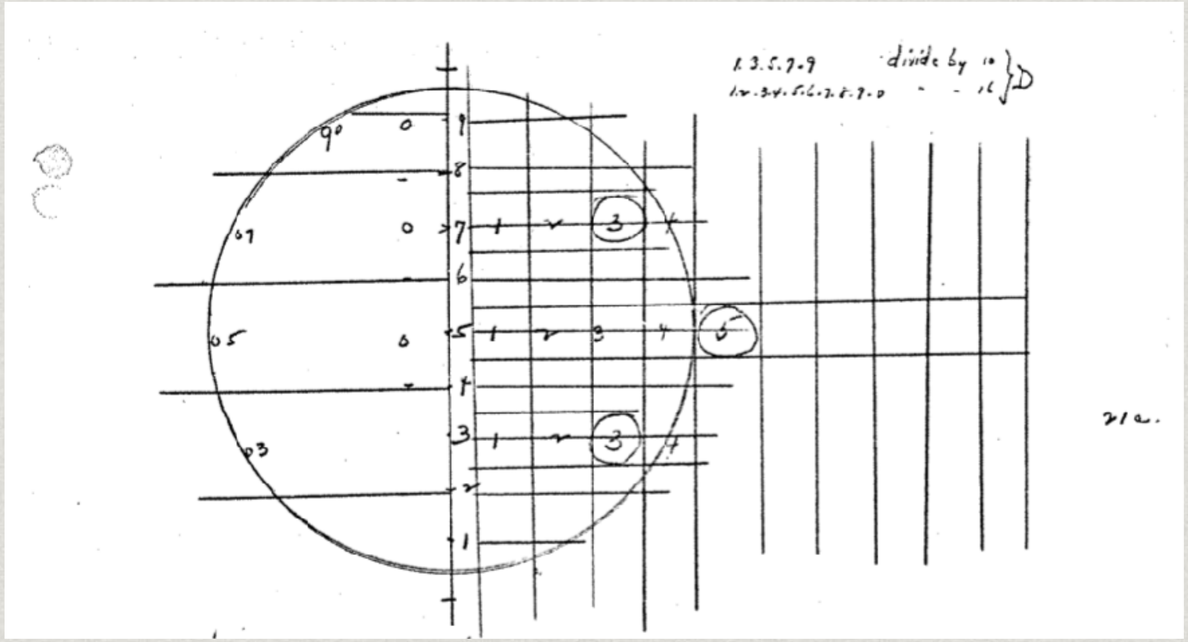
- Energy
- Intensity
- Saturation
- Chroma
- Purity
- Freedom from white light

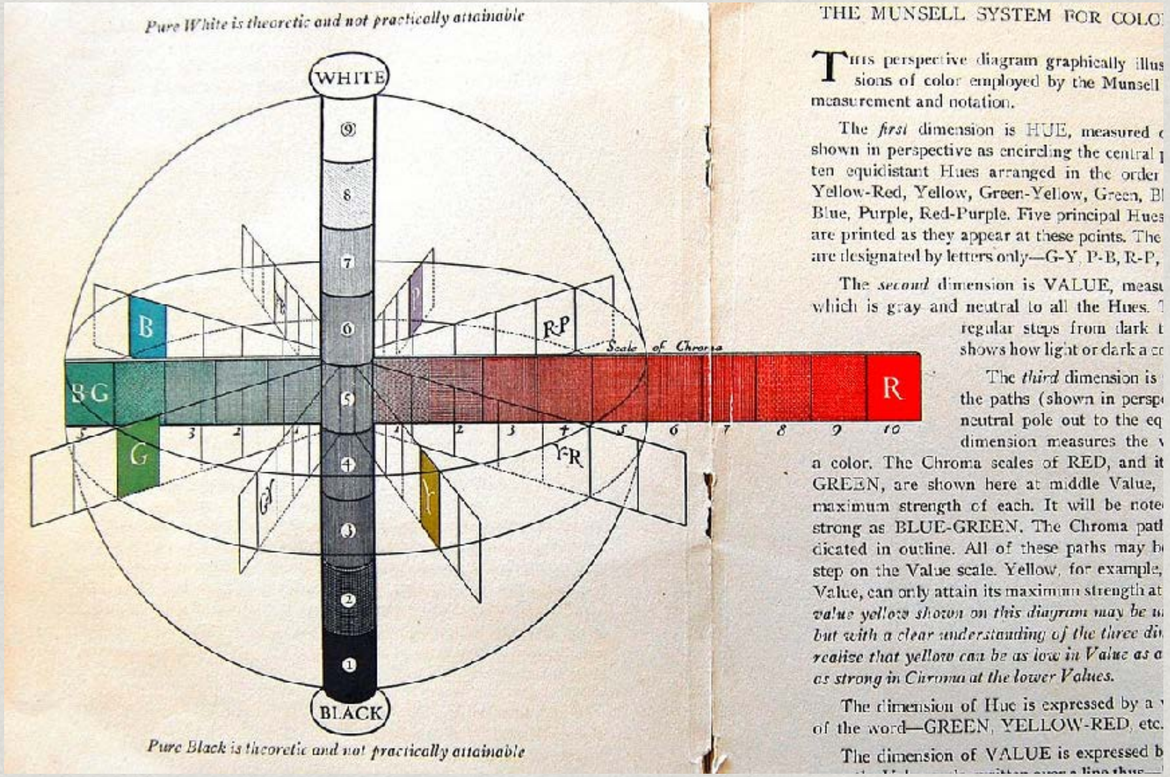






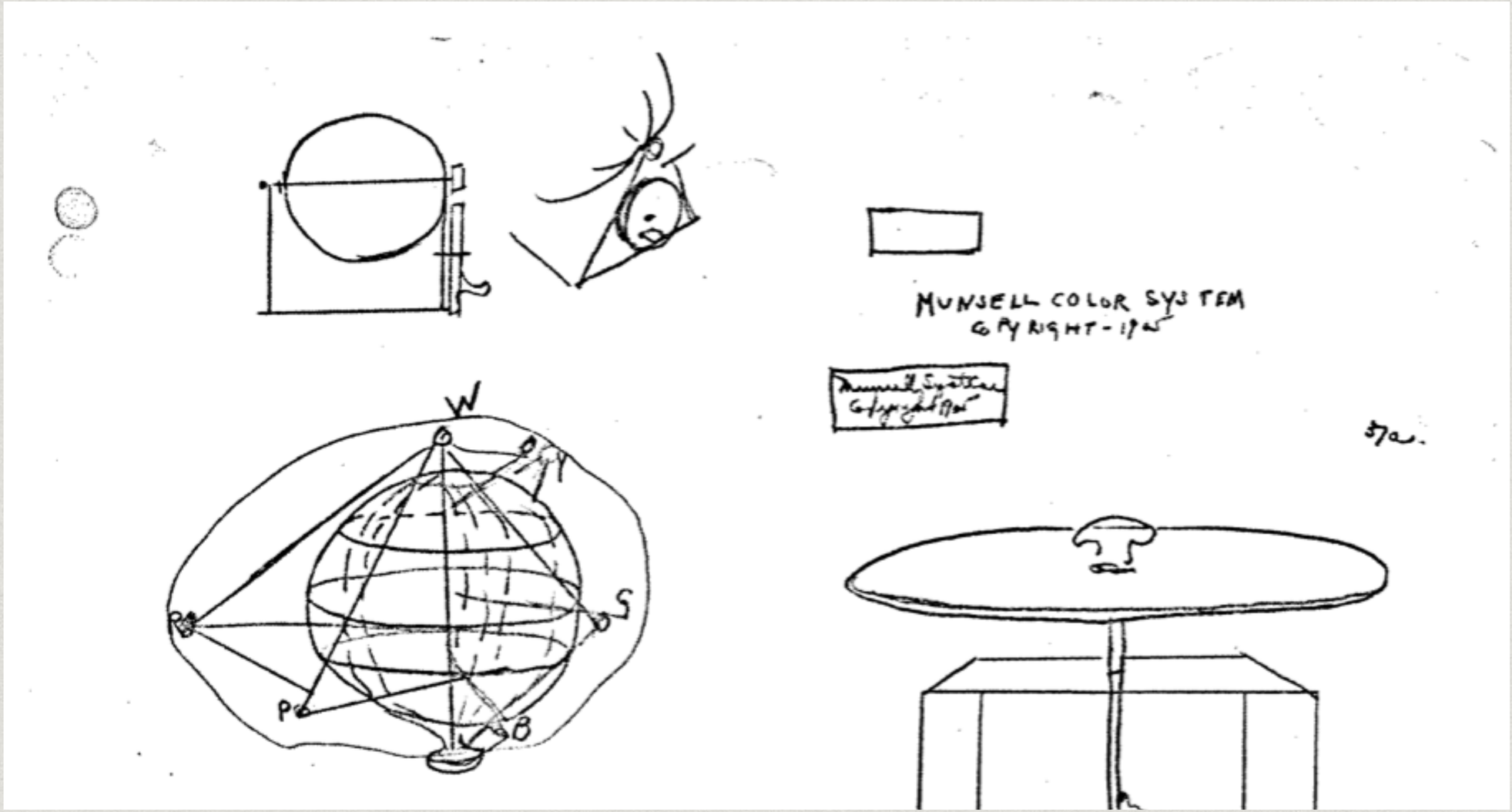
Chroma: Departure from Gray at Constant Value





If you are using photometry to measure reflectance, you would bin by Value, and thus, Chroma is perpendicular

Extending the Sphere

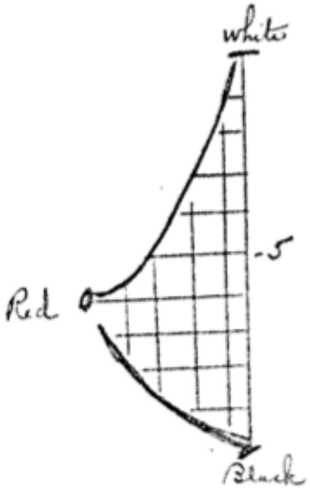


Mixing Paint Does Not Fit Concept of Chroma

PIGMENT CURVE describes combined C & V or any Hue

Set of templates grading any color to W & B
by 10 equal steps

Given, the strongest sensation of Red
1. to grade it to white)
2. " " " " black) by equal
3. " " " " gray) sensations



Experiments show that

1. Equal loss of chroma requires unequal steps of value.

2. Unequal steps of chroma will permit equal steps of value.

Defining Chroma Spacing with Psychometric Function

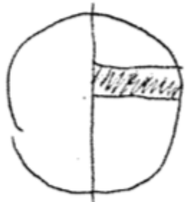
See Vol. 2 (p.40) and Vol.1 (p.49) p.32 in this book.

see p 60
see p 108
see p 191

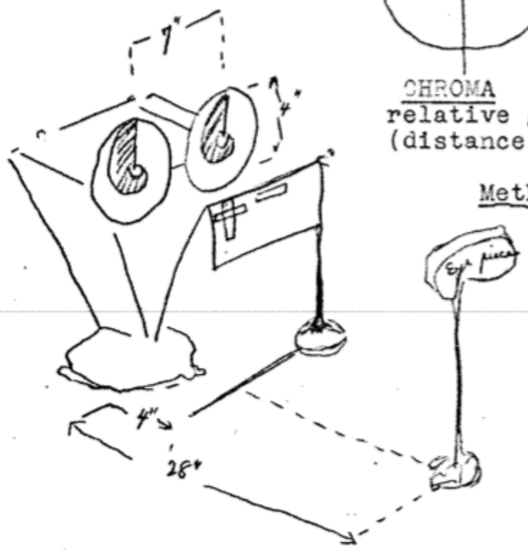
Same disc in color reverses gradation

1a.

Gray disc -to graduate chroma built by geometric areas.



-no lighter)
only grayer)less chroma

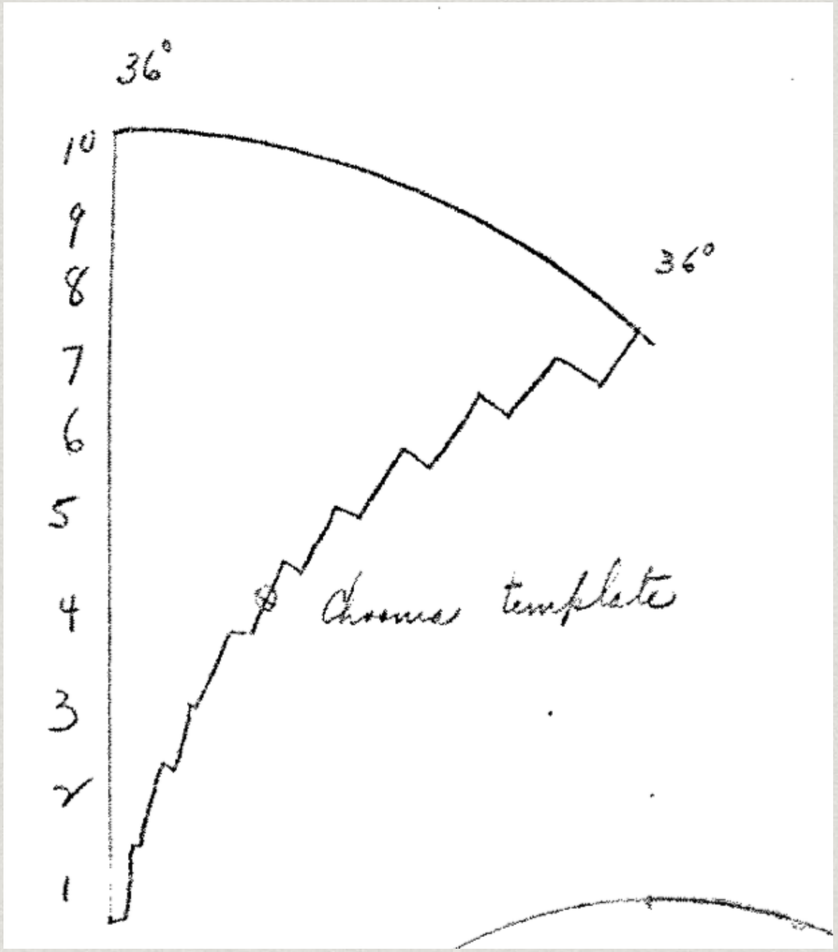


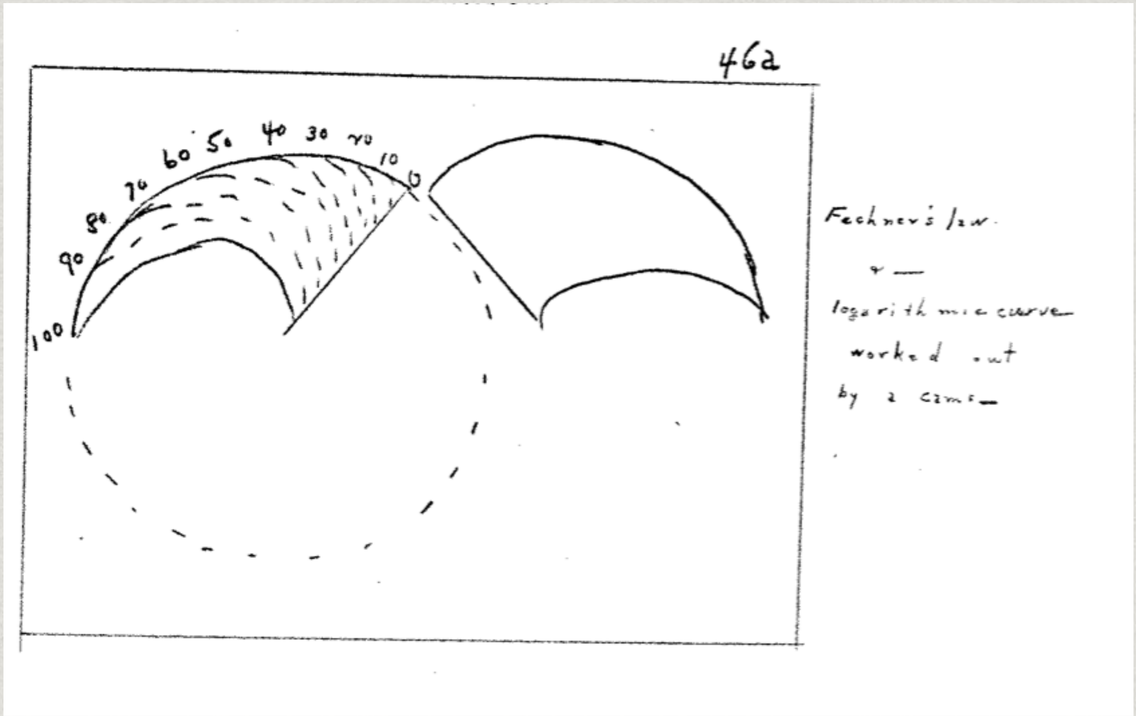
CHROMA
relative grayness
(distance out from neutral axis)

Methods of determination

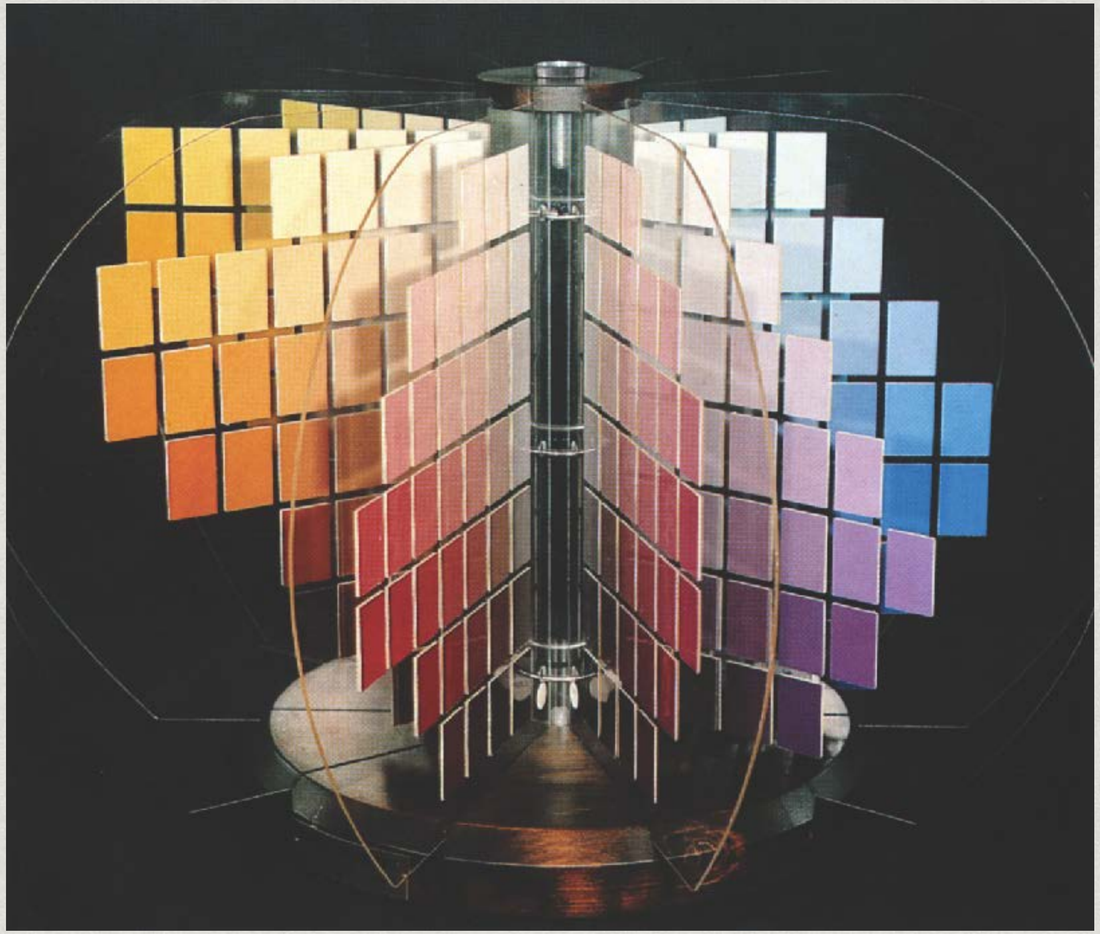
I. Union with compl. to form gray, inversely as areas of discs
II. Least perceptible addi-)of tion or subtraction) C.
III. Radius as a scale of C.

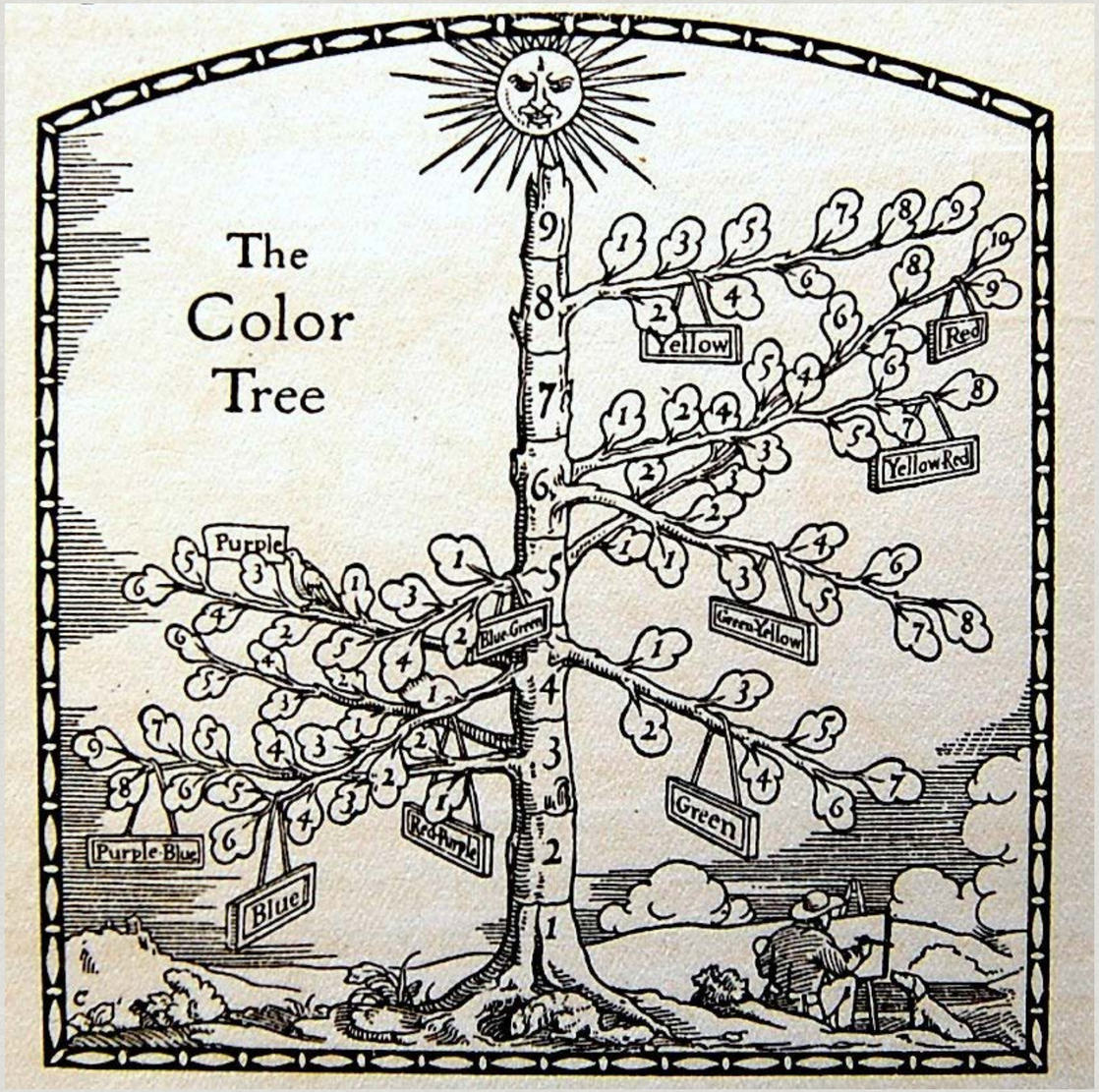
Chroma Template Based on Psychometric Function



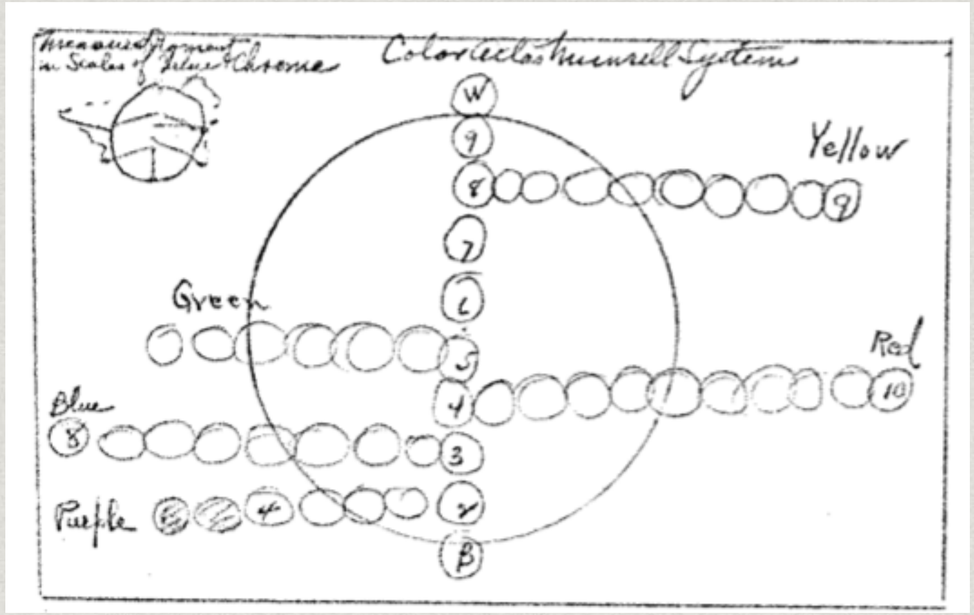


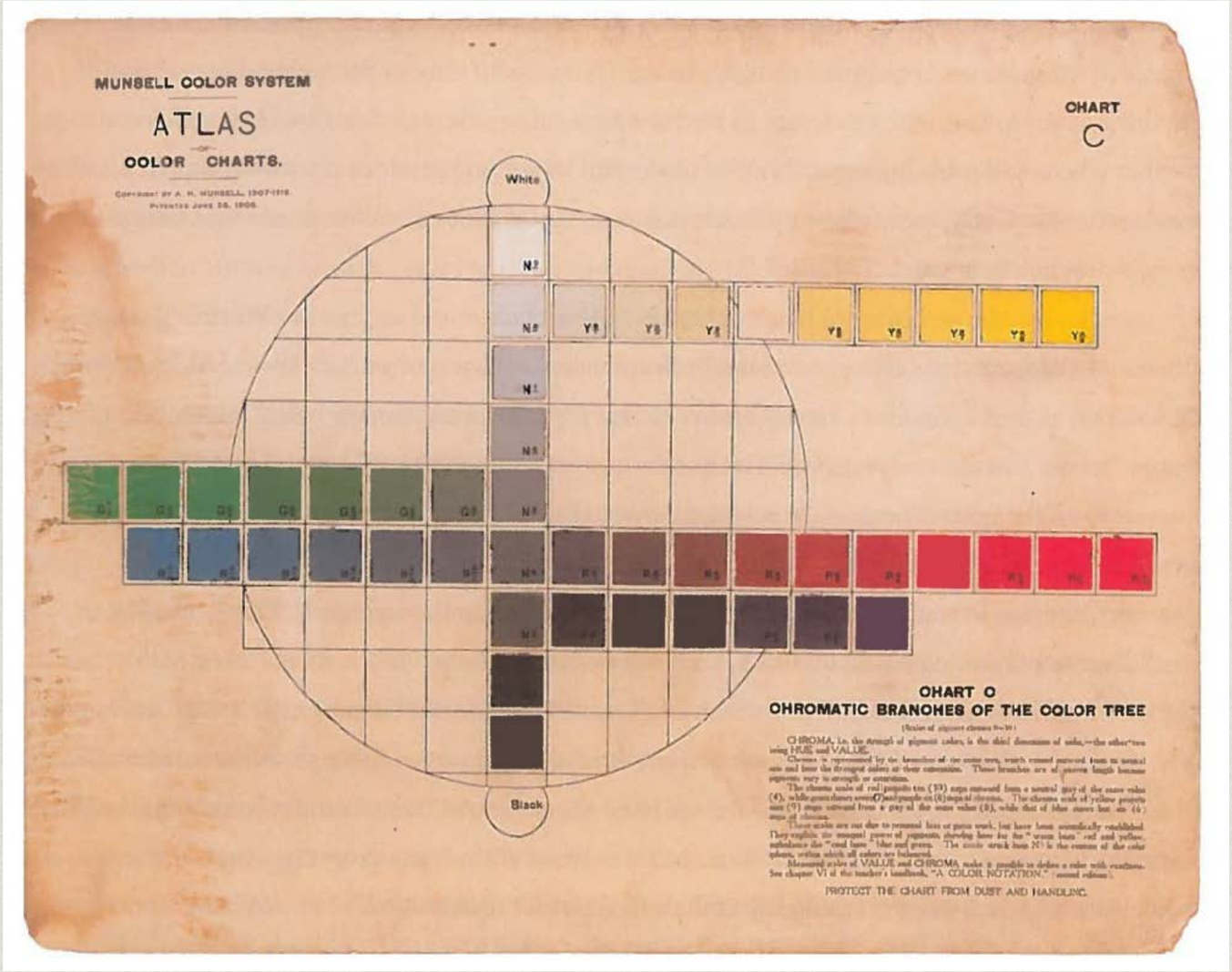
Munsell Tree





Atlas of the Munsell Color System





MUNSELL COLOR SYSTEM

ATLAS
—OF—
COLOR CHARTS.

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PATENTED JUNE 26, 1906.

CHART
60

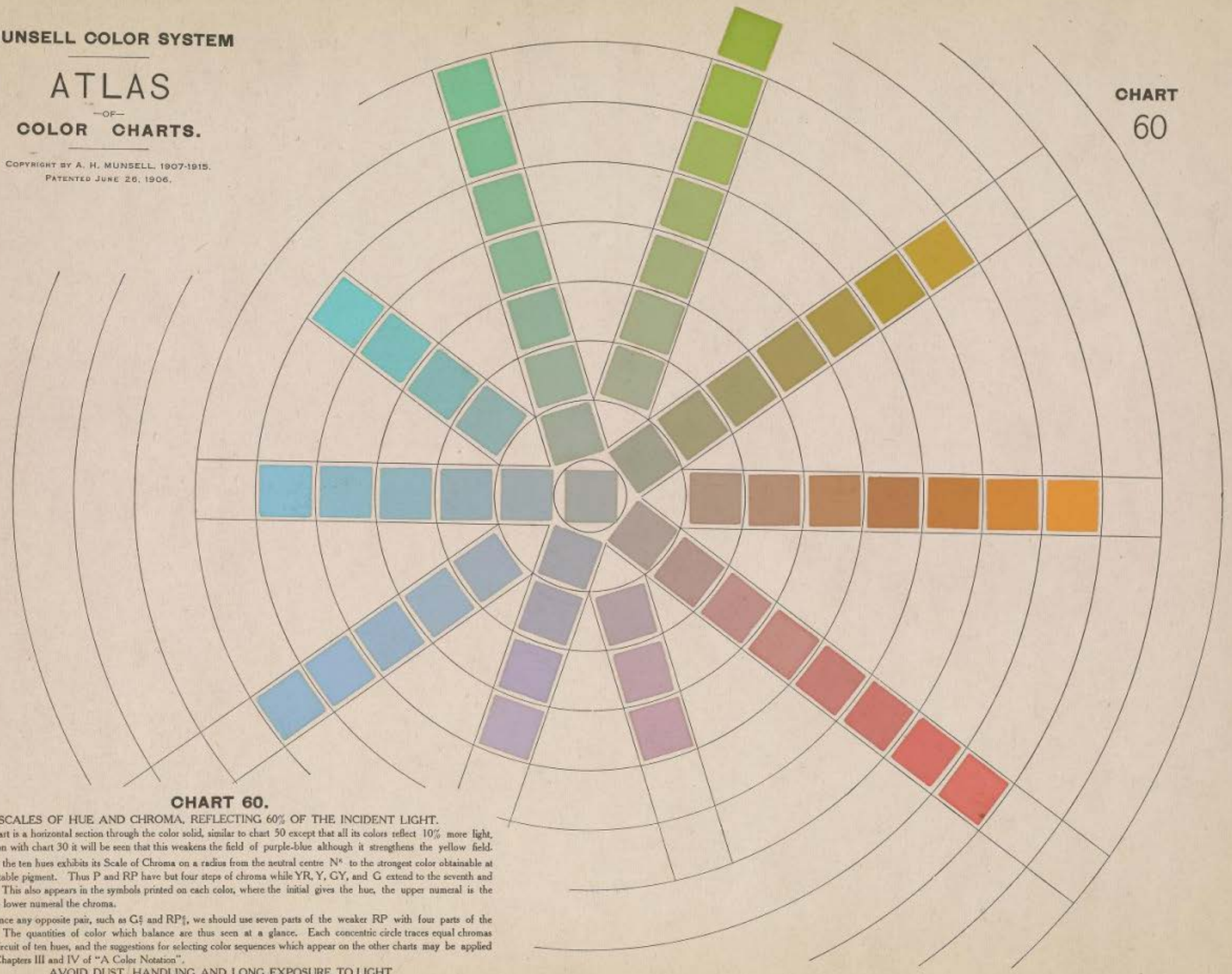

CHART 60.

SCALES OF HUE AND CHROMA, REFLECTING 60% OF THE INCIDENT LIGHT.

This chart is a horizontal section through the color solid, similar to chart 50 except that all its colors reflect 10% more light. By comparison with chart 30 it will be seen that this weakens the field of purple-blue although it strengthens the yellow field.

Each of the ten hues exhibits its Scale of Chroma on a radius from the neutral centre N⁵ to the strongest color obtainable at this level in stable pigment. Thus P and RP have but four steps of chroma while YR, Y, GY, and G extend to the seventh and eighth step. This also appears in the symbols printed on each color, where the initial gives the hue, the upper numeral is the value and the lower numeral the chroma.

To balance any opposite pair, such as G$\frac{8}{4}$ and RP$\frac{5}{4}$, we should use seven parts of the weaker RP with four parts of the stronger G. The quantities of color which balance are thus seen at a glance. Each concentric circle traces equal chromas through the circuit of ten hues, and the suggestions for selecting color sequences which appear on the other charts may be applied here. See Chapters III and IV of "A Color Notation".

AVOID DUST, HANDLING AND LONG EXPOSURE TO LIGHT

MUNSELL COLOR SYSTEM

ATLAS
—OF—
COLOR CHARTS.

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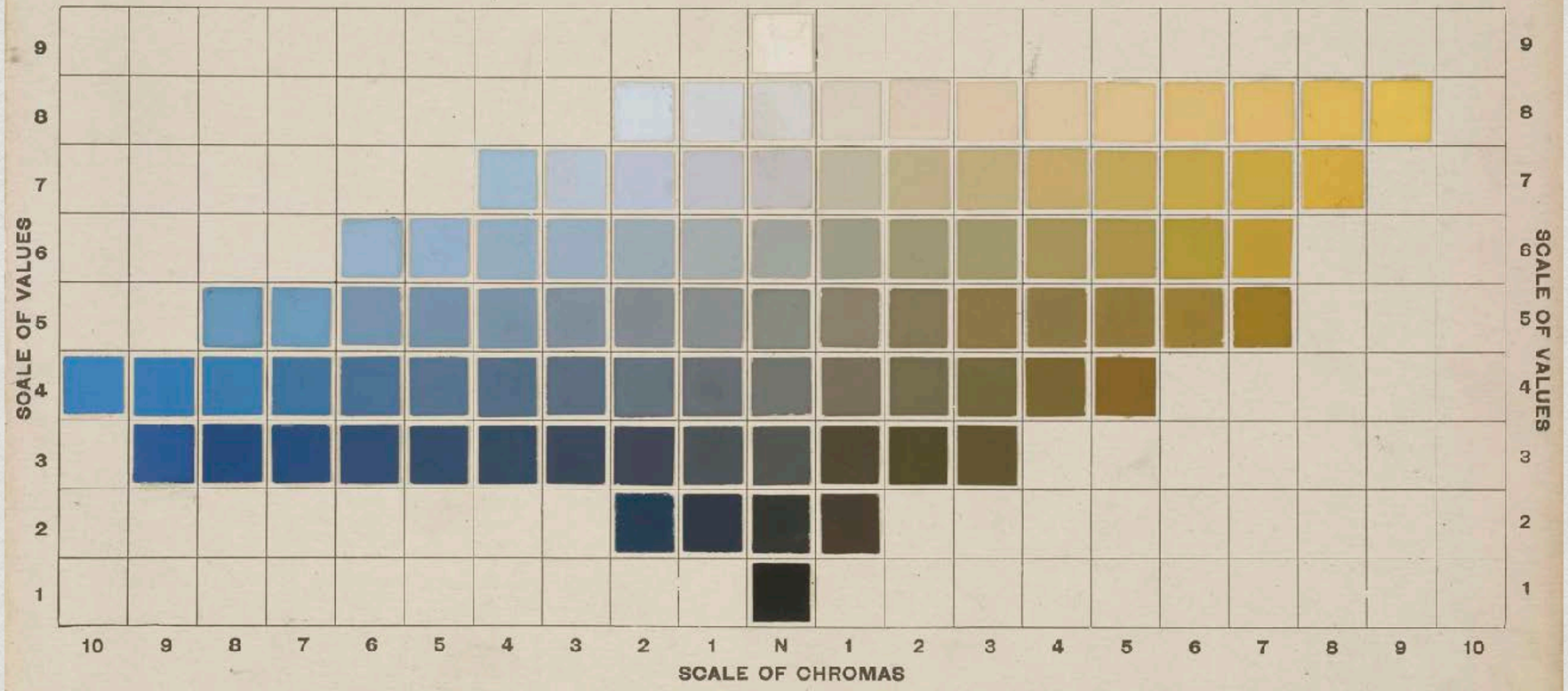
CHART
Y



YELLOW AND PURPLE-BLUE CHART.

This chart presents a vertical plane passed through the axis of the color solid and bearing the complementary hues, yellow and purple-blue. This pair of opposite hues is shown in regular measured scales from black to white, and from grayness to the strongest color made in stable pigment.

VALUES of yellow and purple-blue range vertically from black (0) to white (10). CHROMAS or strengths of color range horizontally from neutral gray to the maximum (10).

Each step in these color scales bears an appropriate symbol describing its light and its strength. Thus Y$\frac{8}{4}$ is zinc yellow, the strongest permanent yellow, which exhibits 90% of chromatic strength and reflects 80% of the incident light. Its opposite PB$\frac{4}{4}$ reflects the same percentage of light but only 20% of chroma. To balance this pair the areas must be inversely as the chroma, i. e., since purple-blue is but two ninths as strong as zinc yellow, it requires nine parts of purple-blue to balance two parts of the yellow. Attention to these measures leads to pleasing combinations.

Any chosen steps of yellow and purple-blue upon this chart may be balanced by noting their symbols: thus light yellow (Y$\frac{8}{2}$) balances dark purple-blue (PB$\frac{2}{8}$), when the areas are inversely as the product of the symbols viz.:-twenty-seven parts of light yellow and seventy-two parts of dark purple-blue.

Chapters III and IV of the handbook, "A Color notation," describe these balances and their combinations with other hues. The symbol on each color step is its NAME, a measure of its light and strength by which it is to be memorized, written and reproduced.

AVOID DUST, HANDLING AND EXPOSURE TO STRONG LIGHT.

MUNSELL COLOR SYSTEM

ATLAS
—OF—
COLOR CHARTS.

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CHART
H

SCALE OF HUES

RP 9 8 7 6 P 4 3 2 1 PB 9 8 7 6 B 4 3 2 1 BG 9 8 7 6 G 4 3 2 1 GY 9 8 7 6 Y 4 3 2 1 YR 9 8 7 6 R 4 3 2 1 RP

SCALE OF VALUES

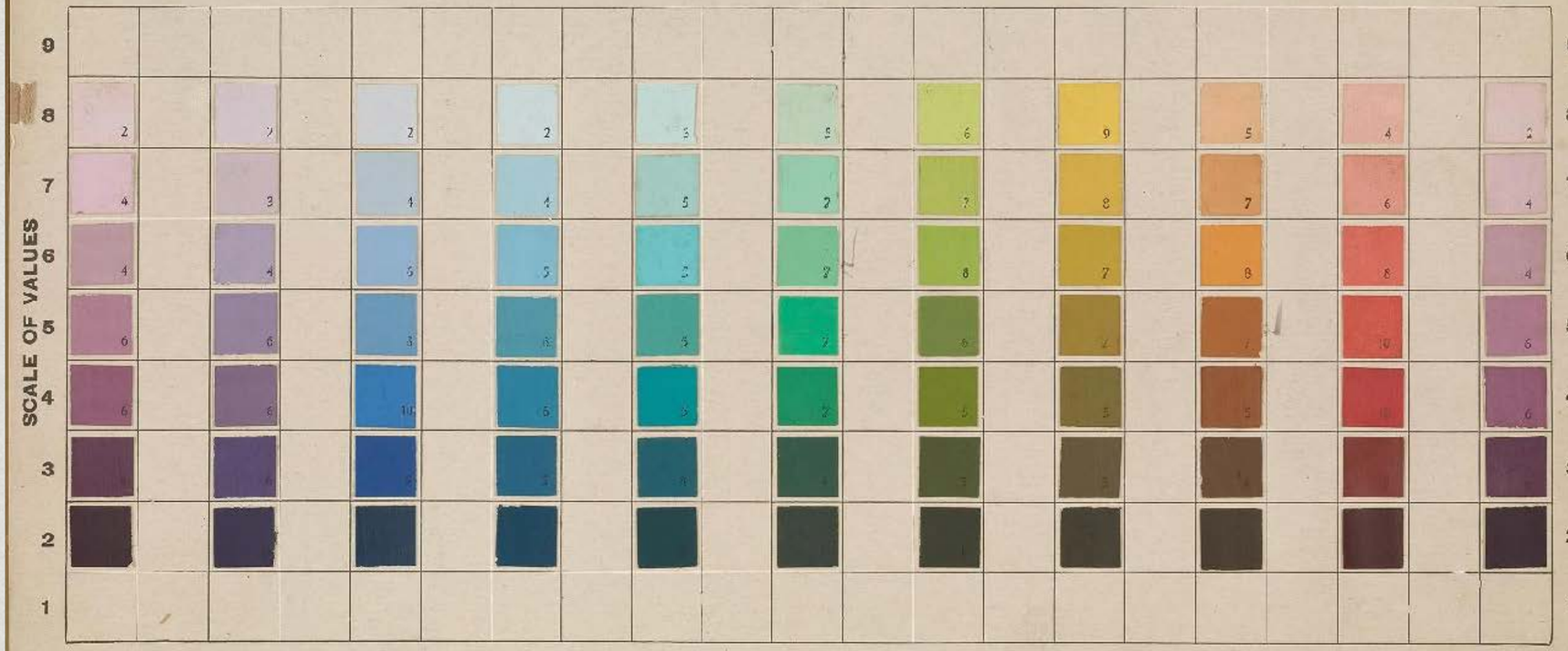


CHART H.

INDEX FOR COLOR NOTATION.

This chart suggests all color paths and records each step by a simple NOTATION. The ten steps of hue are written RP (red-purple), P (purple), PB (purple-blue), B (blue), BG (blue-green), G (green), GY (green-yellow), Y (yellow), YR (yellow-red or orange), and R (red).

Initials at the top of the chart trace the Sequence of Hues; numerals at the side trace the Sequence of Value and the small numerals pointed on each color step is an index of its Chroma i.e. strength or saturation. The color step made of vermilion bears the chroma numeral 10, it is at the value level 6 and in the red column R. This step is written $5R\ \frac{6}{10}$ as explained in a previous introduction and in chapter VI of "A Color Notation."

If this chart were bent around the equator of the color sphere forming a cylindrical envelope, it would imitate a mercator chart of the globe, each hue taking the place of a meridian and each value level representing a parallel of latitude, while the chroma numerals would correspond to altitudes.

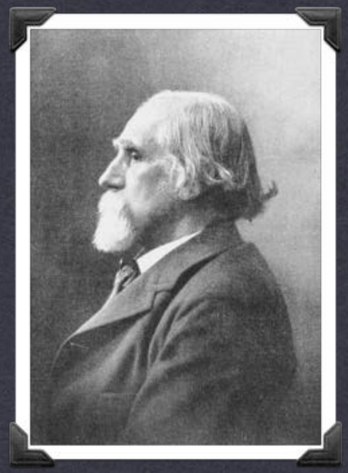
Were this cylinder cut open on the red-purple meridian (RP) it would spread out to form this Hue Chart: green being at its center with yellow and red (warm hues) to the right, and the cool hues blue and purple to the left.

Colors shown on this chart form the *irregular outside* of the color tree, between which and the neutral gray trunk are the intermediate degrees of weaker chroma, which appear on the succeeding charts R, Y, G, B, P and 20, 30, 40, 50, 60, 70, 80, of the system.

AVOID DUST, HANDLING AND EXPOSURE TO STRONG LIGHT.

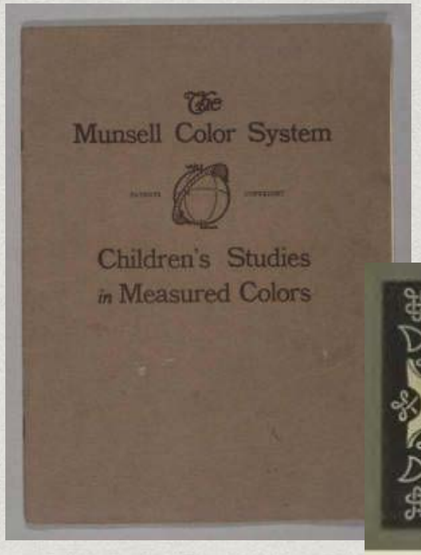
“YOU HAVE PUT AN ARTISTIC IDEA INTO SCIENTIFIC FORM”

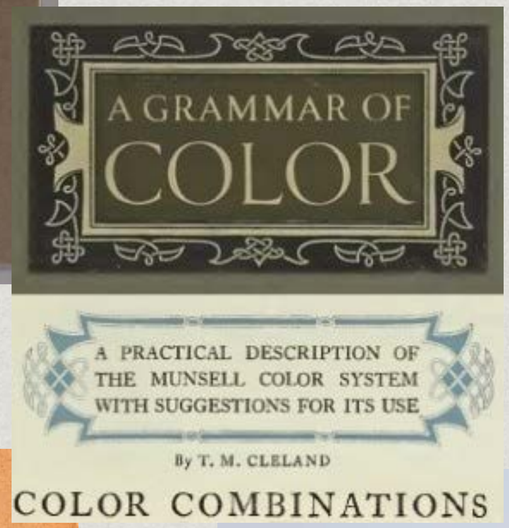
Professor Ogden Rood, April 1900

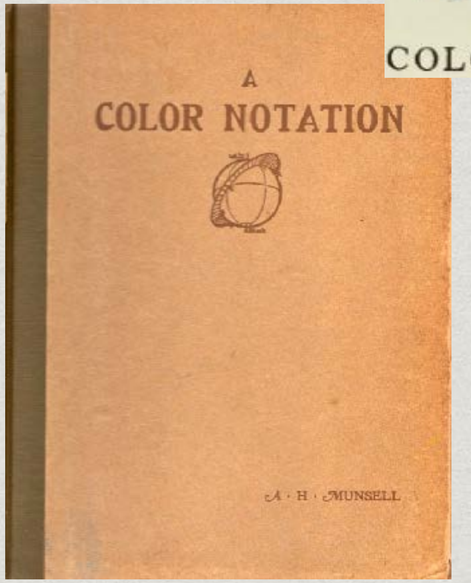


Products

- Sphere
- Atlas
- Books
- Crayons
- Watercolors







A. E. O. Munsell

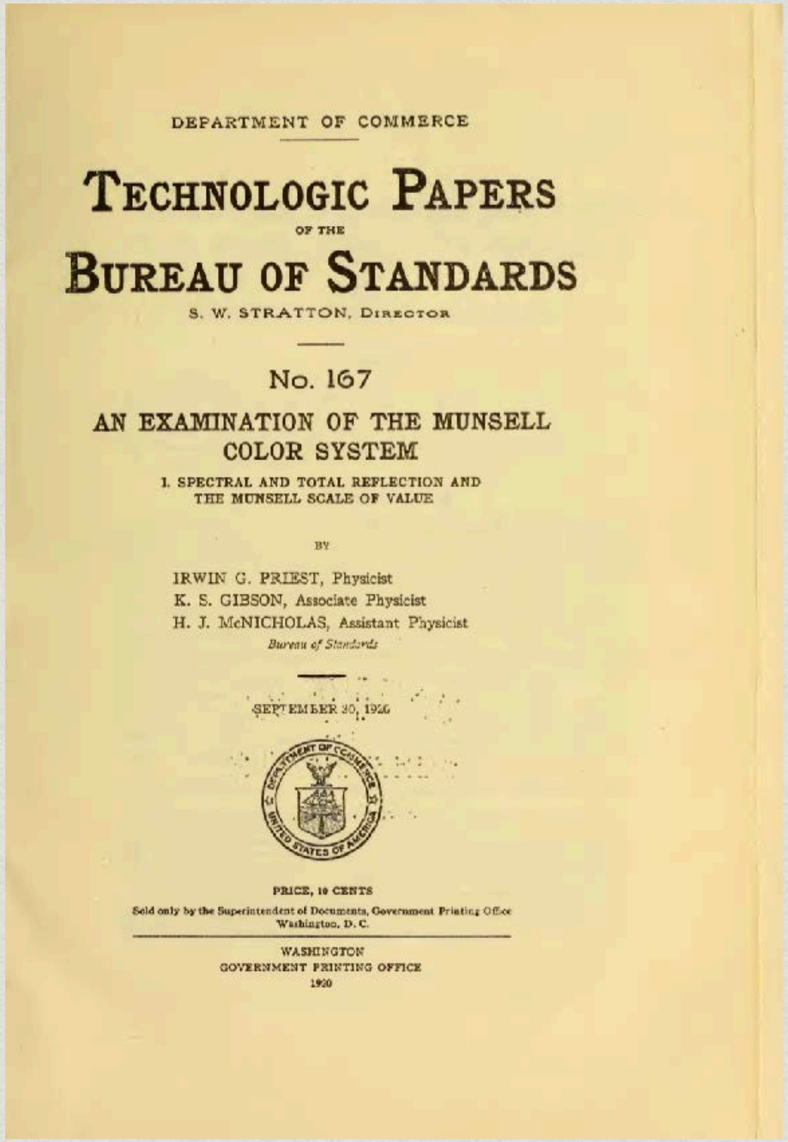
“From his earliest days with the Company, Alex Munsell was greatly influenced by Irwin G. Priest, chief of the Colorimetry Section of the Bureau of Standards and an active leader in the Optical Society of America’s outstanding Committee on Colorimetry.

Mr. Munsell was neither a business man nor an artist. His interest lay, rather, in scientific fields, and from the beginning he left much of the handling of the business of the Company to others, while he concentrated on the scientific aspects of the Munsell work. The writer’s first memory of A.E.O. Munsell is that of his enthusiasm upon his return from the 1921 October meeting, of the Optical Society of America where he had met and talked with I. G. Priest. It was at that meeting that he first heard of Carl W. Keuffel’s direct-reading spectrophotometer, later described before the O.S.A. One was ordered on the spot and was delivered in New York to the Munsell Research Laboratory during the next year.”

Ms. Dorothy Nickerson, 1940

Modifying the Atlas: The 1929 Munsell Book of Color

- Errors in the photometer
- Errors in manufacturing
- Is a square root the correct psychometric function?
- More rigorous specification for defining system and its manufacture



DEPARTMENT OF COMMERCE

TECHNOLOGIC PAPERS
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BUREAU OF STANDARDS
S. W. STRATTON, DIRECTOR

No. 167

AN EXAMINATION OF THE MUNSELL COLOR SYSTEM

I. SPECTRAL AND TOTAL REFLECTION AND THE MUNSELL SCALE OF VALUE

BY

IRWIN G. PRIEST, Physicist
K. S. GIBSON, Associate Physicist
H. J. McNICHOLAS, Assistant Physicist
Bureau of Standards

SEPTEMBER 30, 1926

PRICE, 10 CENTS

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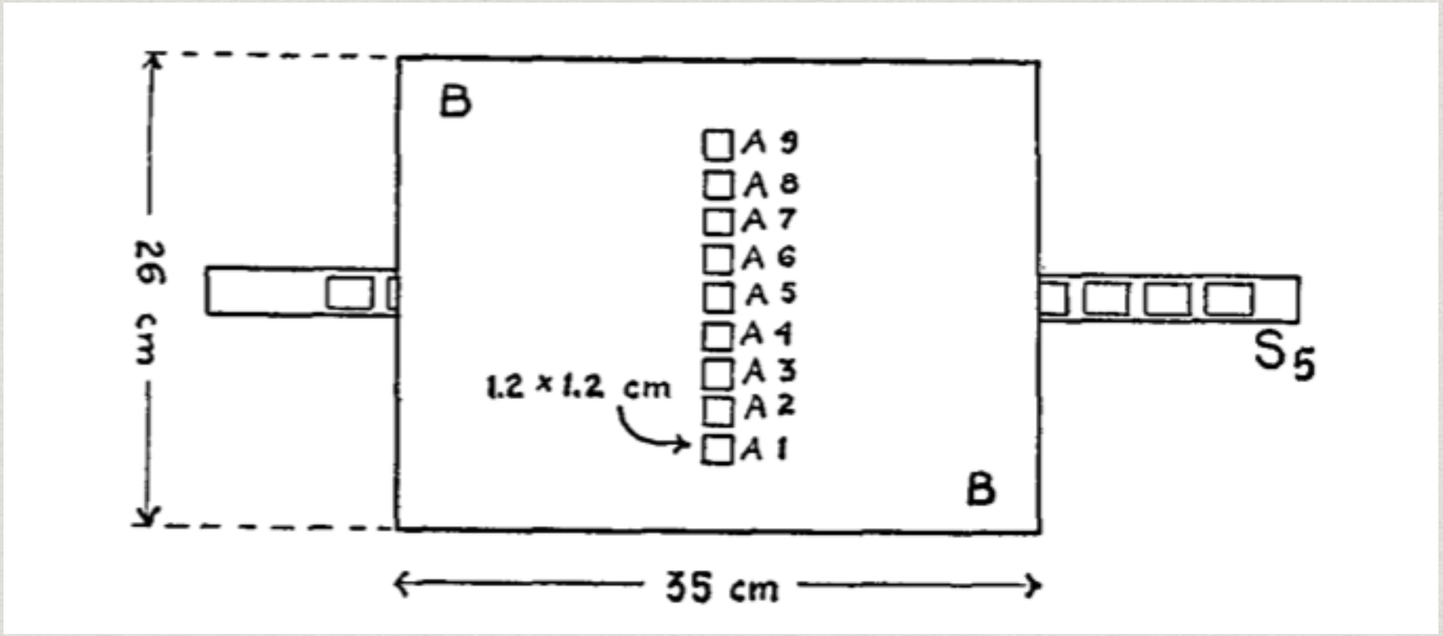
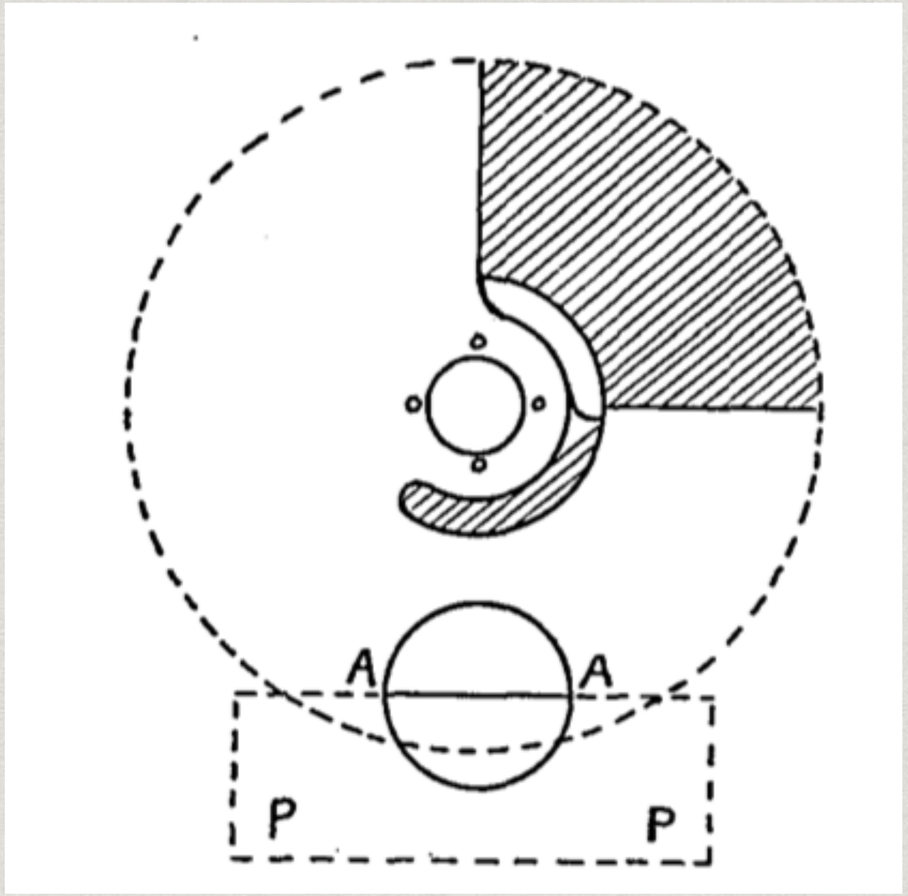
1926

New Experiments to Scale Hue, Value, and Chroma





In collaboration with the National Bureau of Standards (NIST)

Revised Value Scale

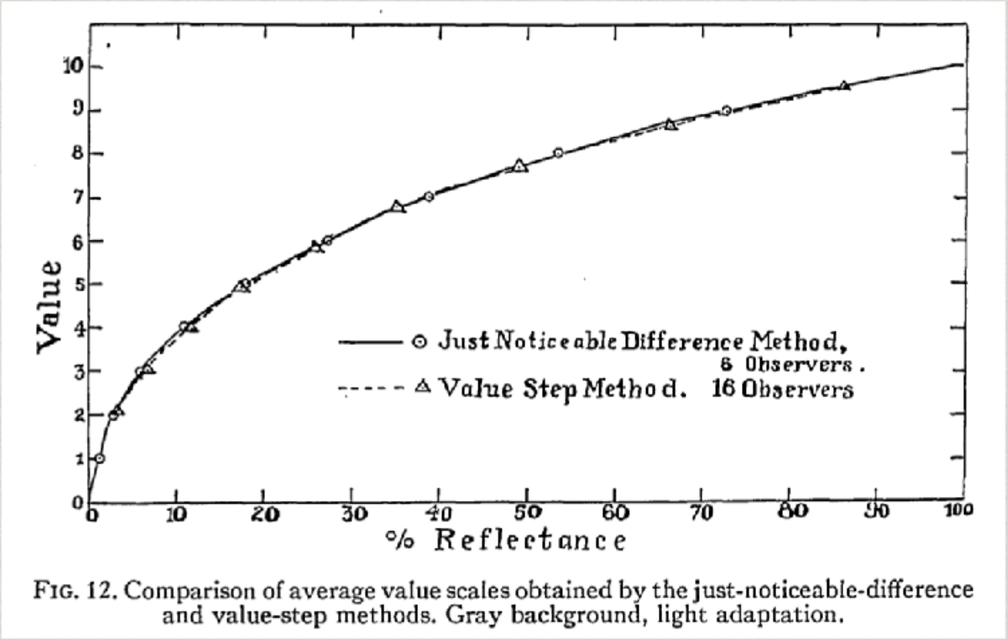
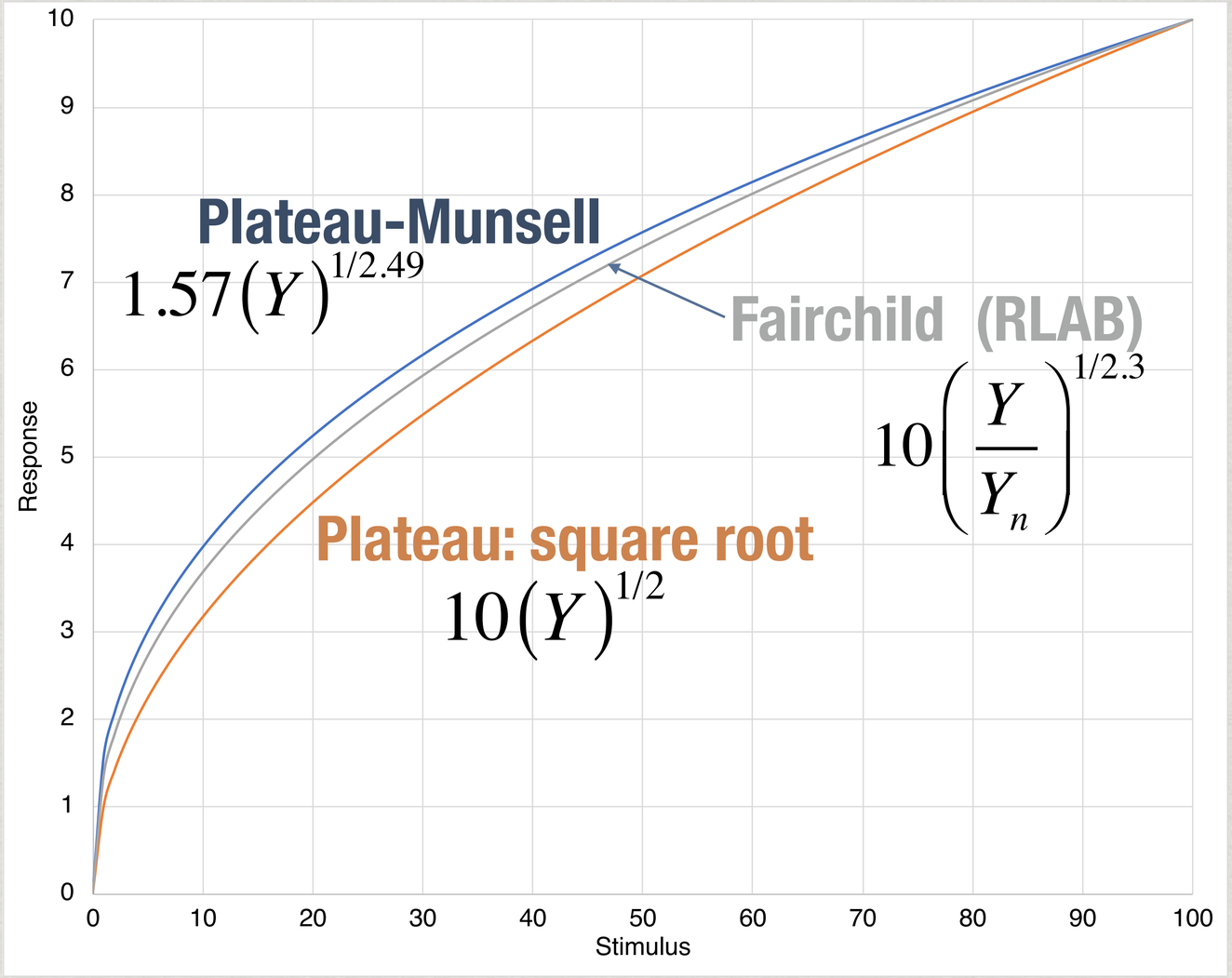


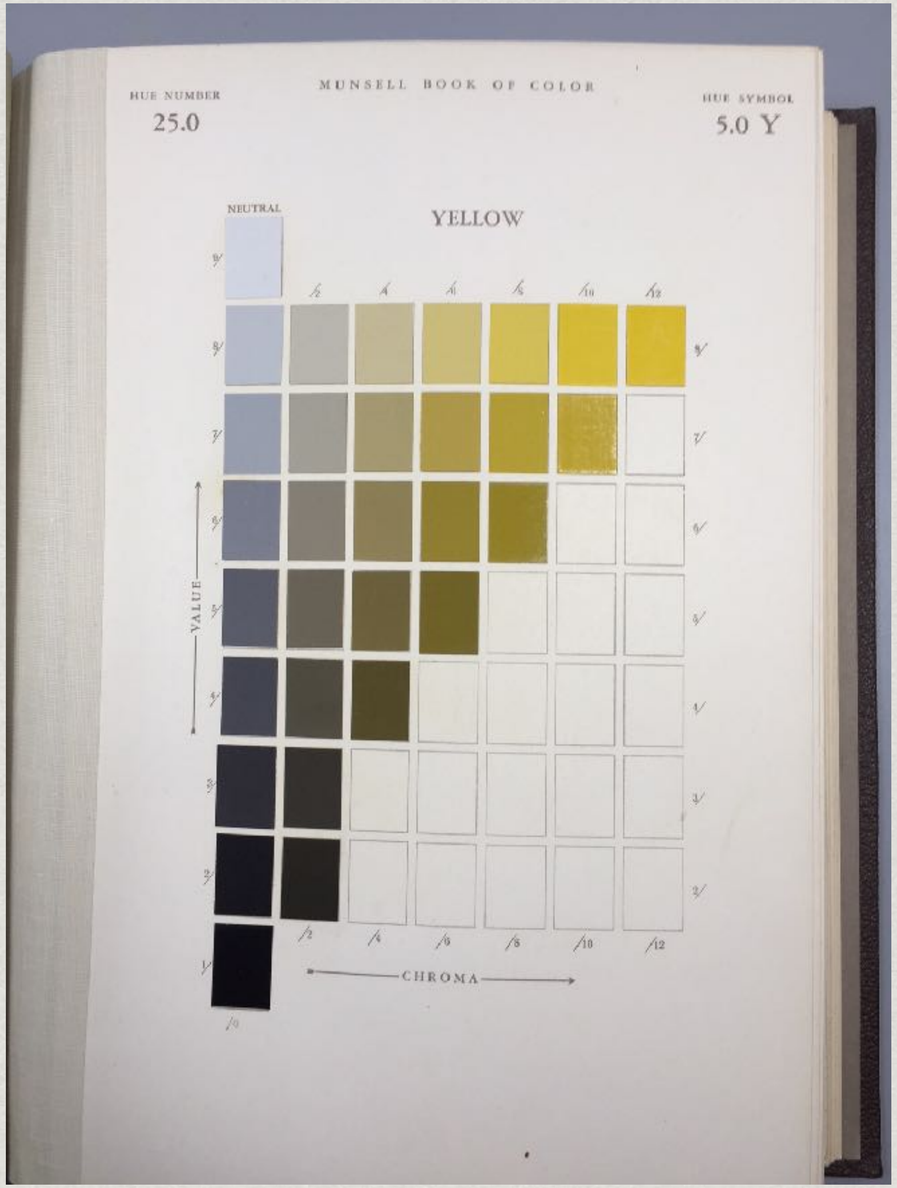
FIG. 12. Comparison of average value scales obtained by the just-noticeable-difference and value-step methods. Gray background, light adaptation.

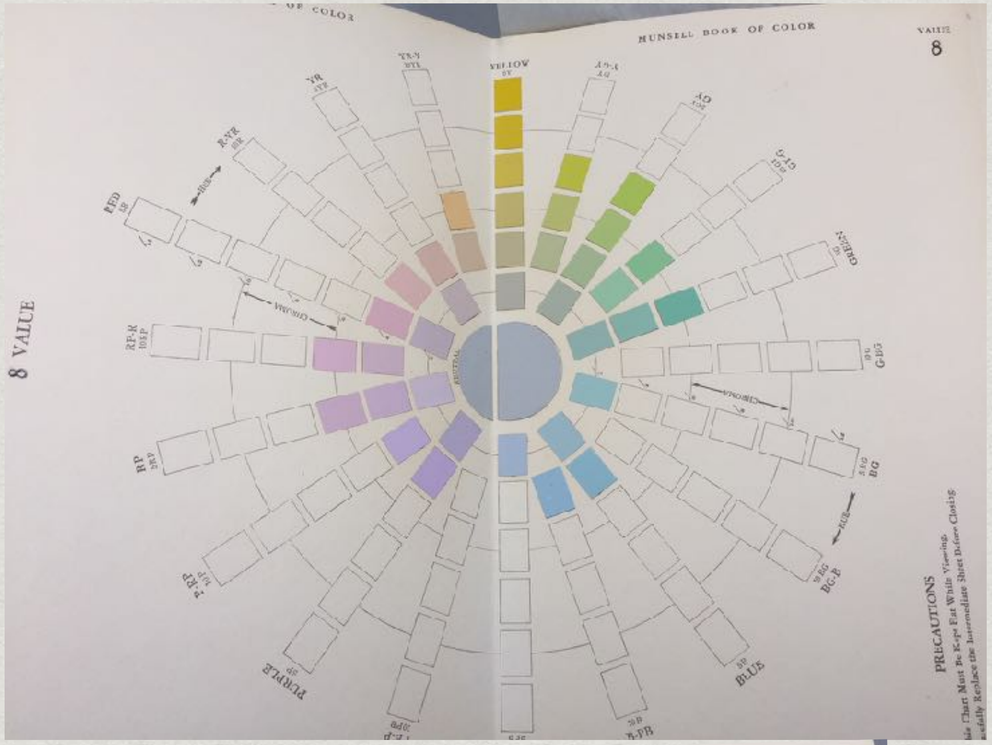


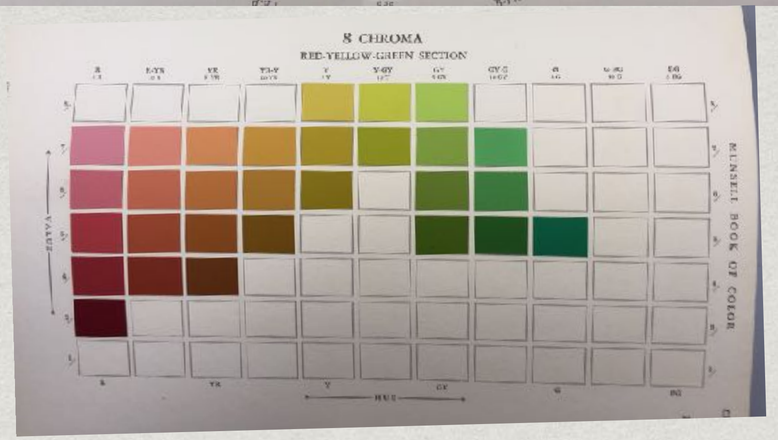
Details

- All colors defined using disk mixtures under controlled daylight.
- Painted papers: primed near color, varnished, final coat matching disk specification.
- Each sample measured with spectrophotometer
- One or two chromatic pigments, black, and white

1929 Munsell Book of Color

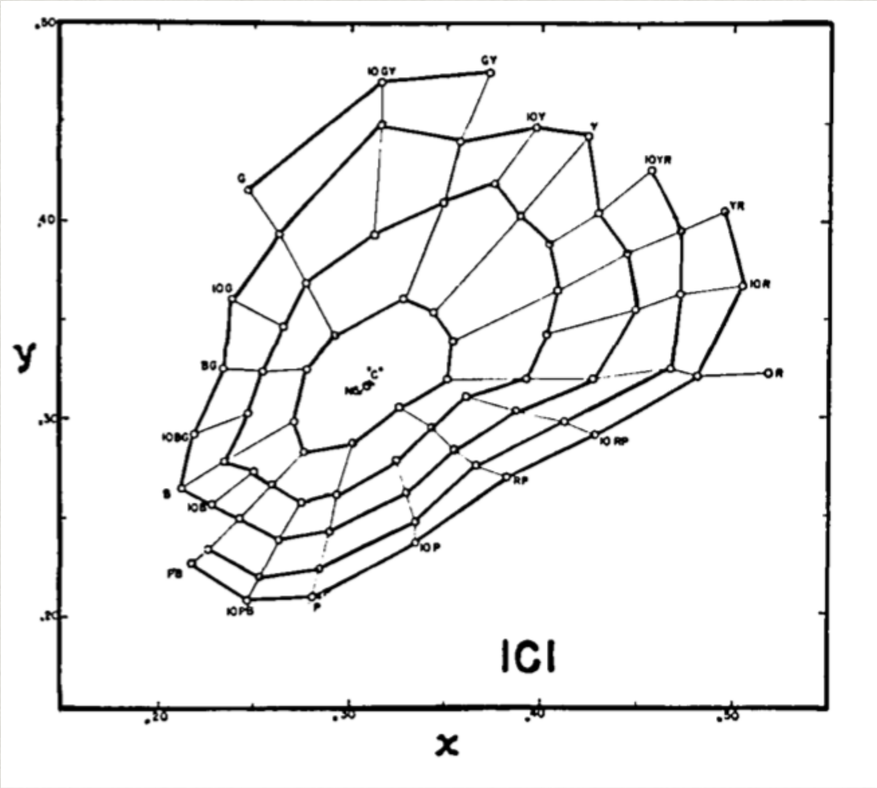






not to scale

Further Improvements by the Optical Society of America

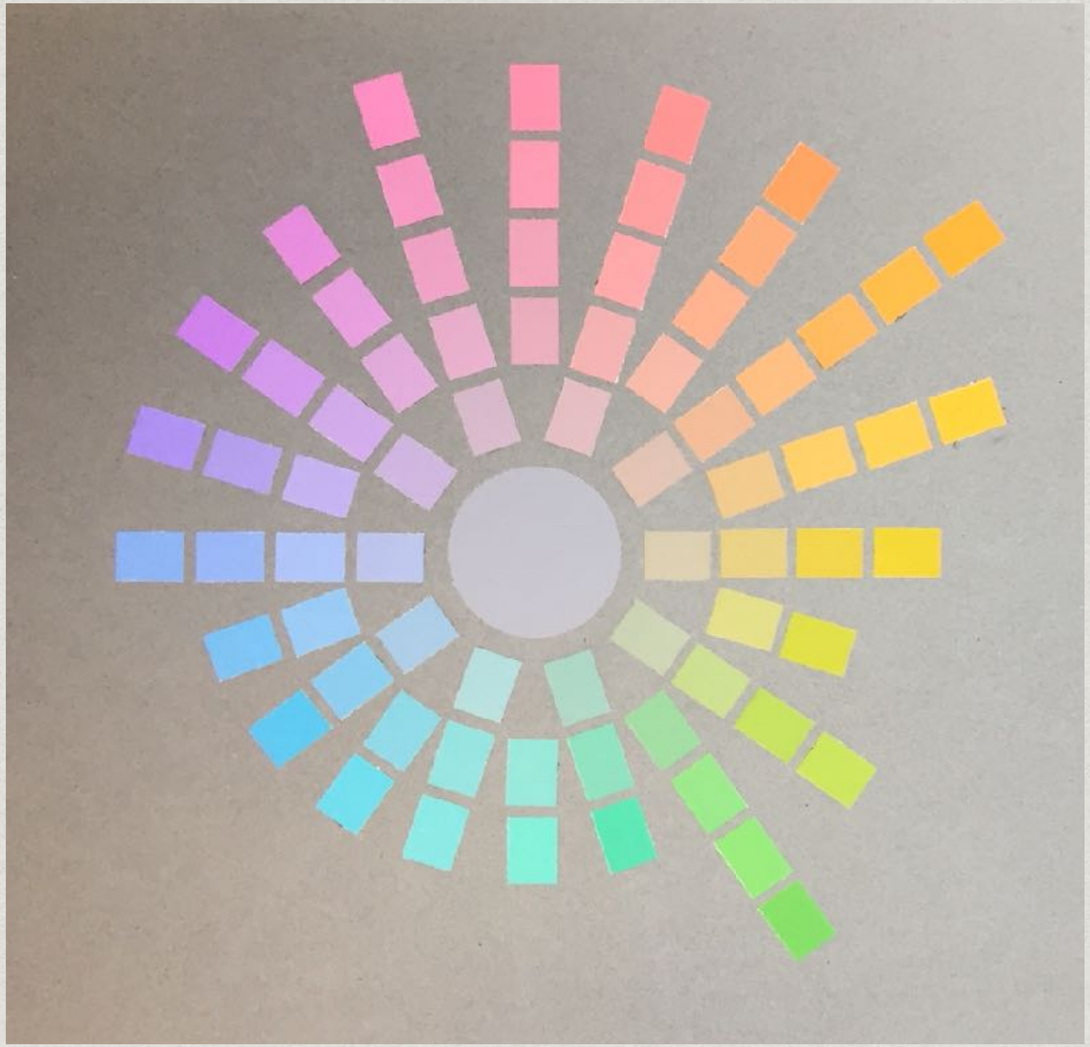


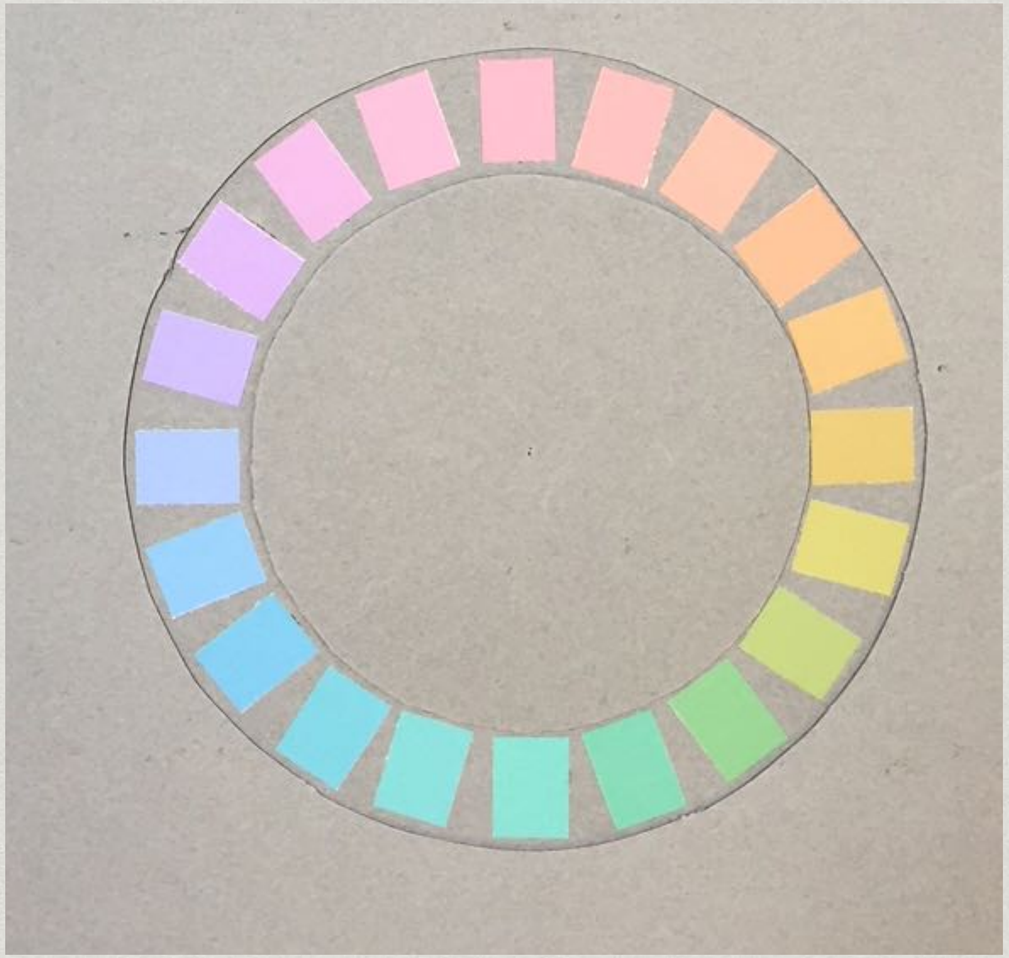
Value 5

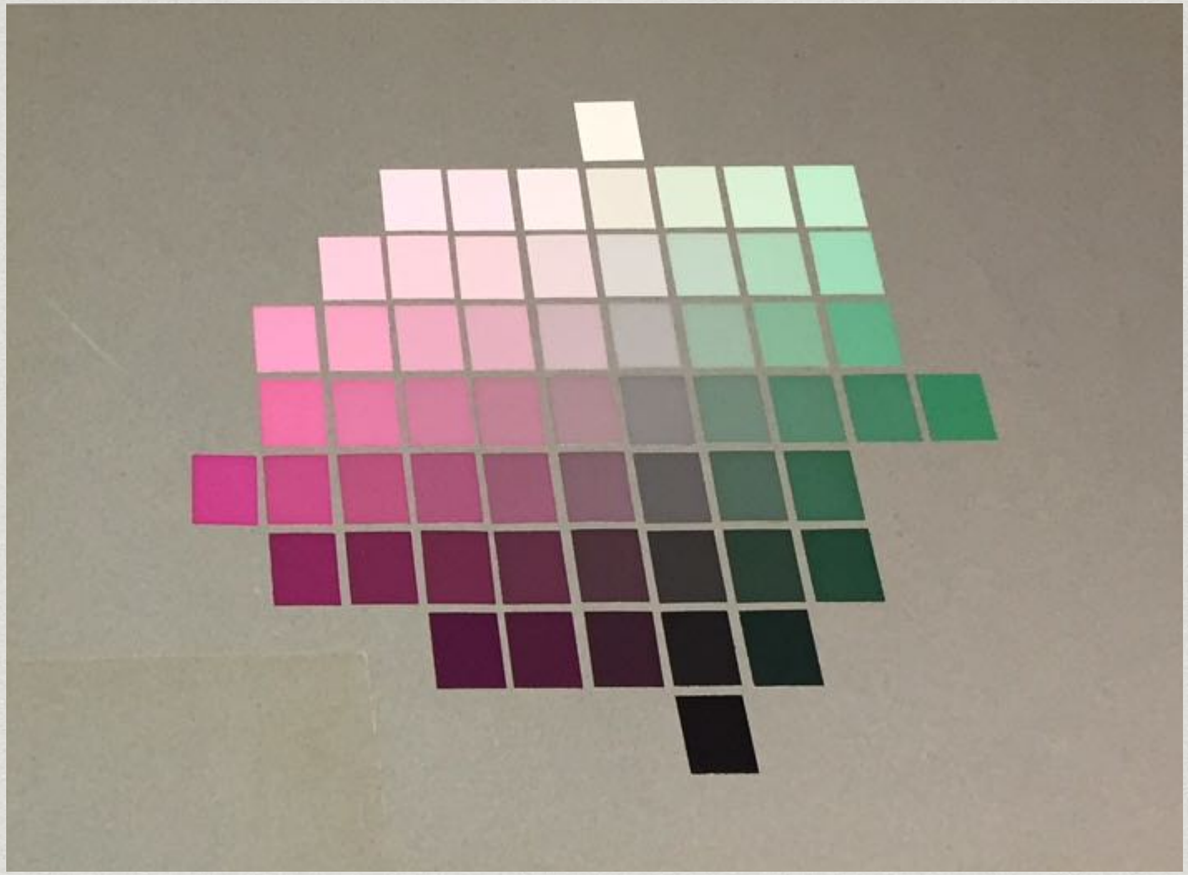
7 constant value charts,
20 constant hue charts,
3 backgrounds
~100 samples / chart
41 observers

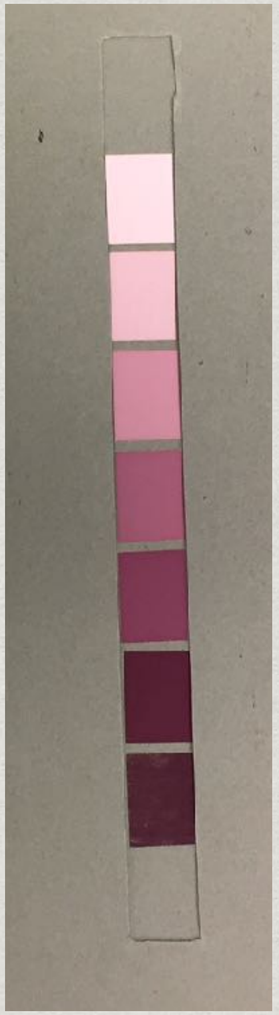
>300,000 observations
(not 3,000,000)

Charts on White, Gray, and Black Backgrounds

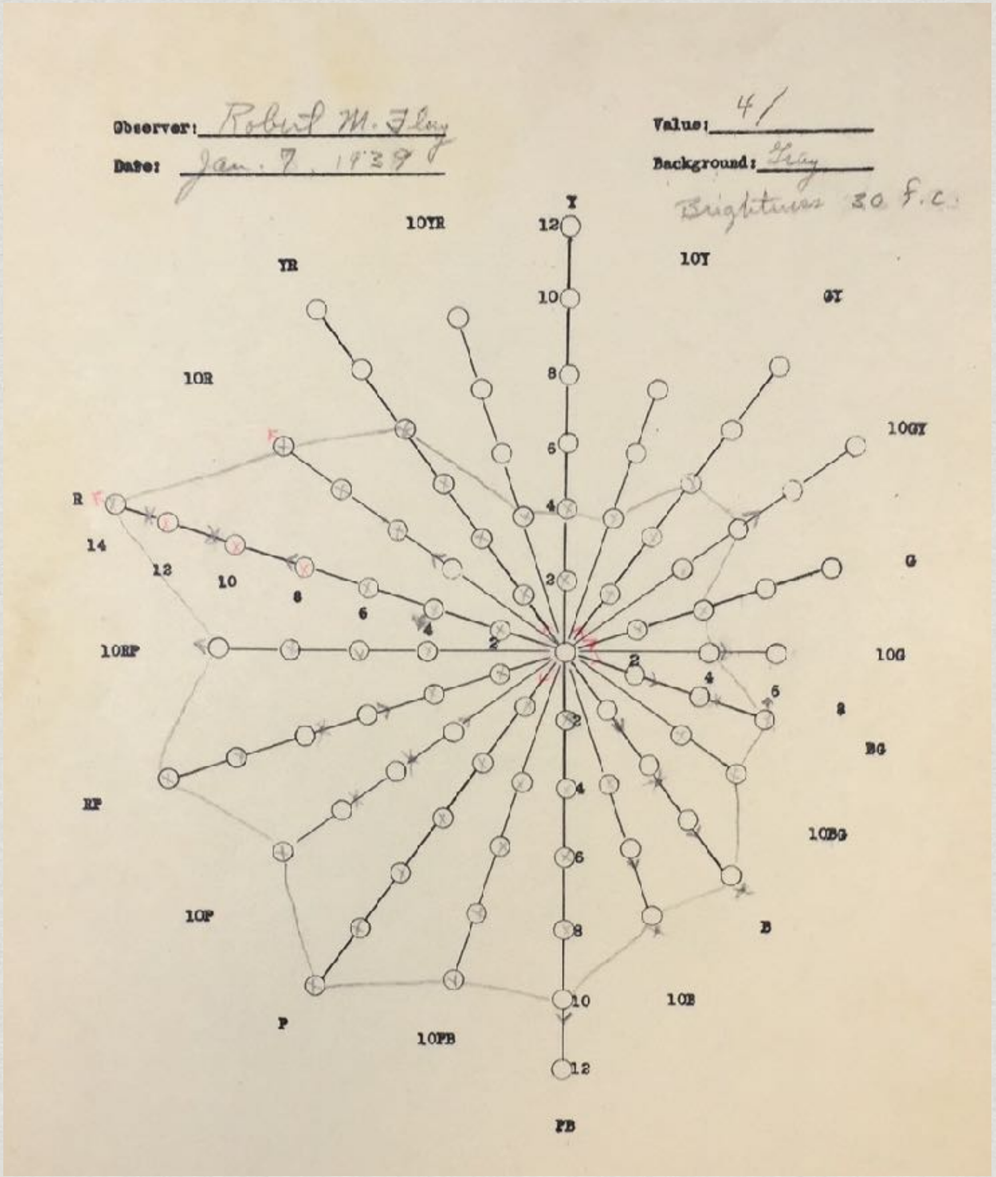








Example Score Sheet



Visual Data Averaged, Plotted on x,y chromaticity diagram on oversized paper, smoothed, and “digitized” manually

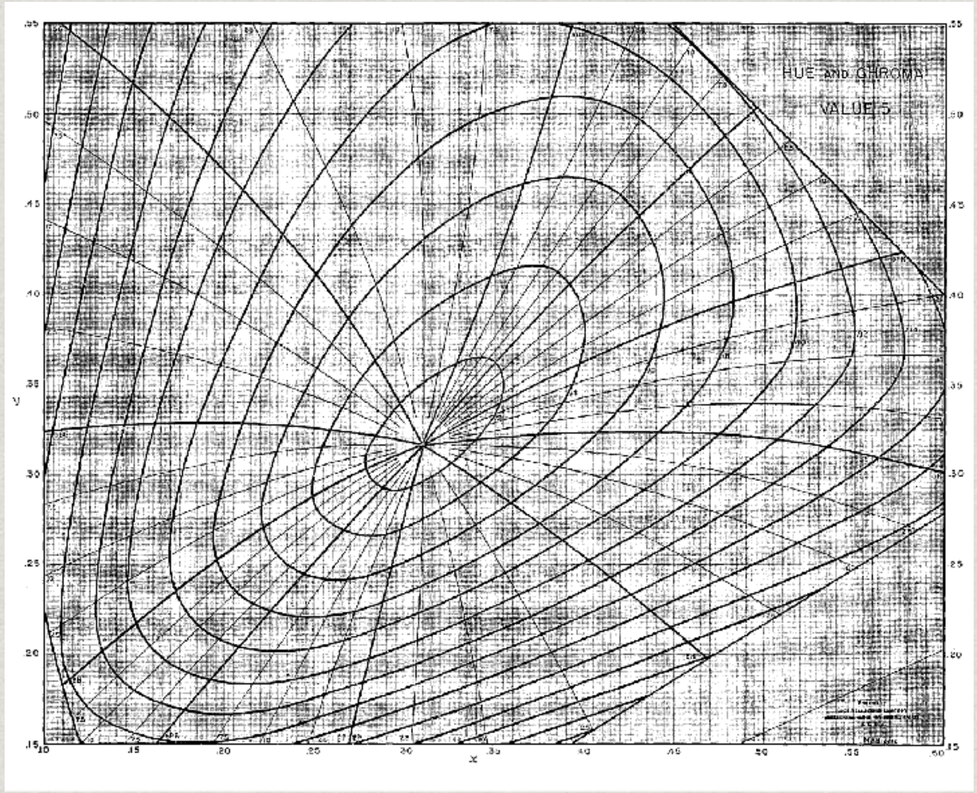


TABLE I.—*Continued.*

		Purples										Red-Purples							
		2.5P		5.0P		7.5P		10.0P				2.5RP		5.0RP		7.5RP		10.0RP	
V/C	*V*	*x*	*y*	*x*	*y*	*x*	*y*	*x*	*y*	P/C	*V*	*x*	*y*	*x*	*y*	*x*	*y*	*x*	*y*
9/6	0.7866	0.2963	0.2858	0.4004	0.2870	.3120	.2788	.3218	.2845	9/6	0.7866	.3322	.2910	.3131	.2988	.3512	.3052	.3590	.3118
4						.3117	.2928	.3178	.2966	4		.3234	.3010	.3108	.3060	.3350	.3099	.3100	.3140
2		.3050	.2951	.3057	.3060	.3107	.3081	.3128	.3094	2		.3149	.3108	.3122	.3126	.3190	.3141	.3205	.3155
8/14	0.5910							.3342	.2349	8/14	0.5910	.3621	.2496						
12						.3117	.2370	.3312	.2470	12		.3552	.2504	.3818	.2742	.4002	.2859		
10				.3870	.2380	.3116	.2497	.3282	.3582	10		.3479	.2609	.3685	.3838	.3880	.2930	.3983	.3049
8		.2800	.2688	.2914	.2534	.3116	.2626	.3250	.2700	8		.3406	.2703	.3570	.2900	.3682	.2983	.3800	.3087
6		.2881	.2671	.2953	.2701	.3114	.2785	.3213	.2829	6		.3327	.2893	.3510	.2978	.3521	.3042	.3600	.3112
4		.2962	.2850	.3012	.2868	.3114	.2915	.3175	.2955	4		.3239	.3000	.3308	.3052	.3350	.3092	.3412	.3138
2		.3048	.3040	.3065	.3047	.3107	.3070	.3131	.3081	2		.3154	.3100	.3150	.3120	.3200	.3136	.3218	.3152
7/22	0.4306							.3420	.1883										
20								.3410	.1988	7/20	0.4306	.3811	.2113						
18						.3093	.1962	.3391	.2088	18		.3751	.2241	.4186	.2459				
16						.3099	.2074	.3368	.2192	16		.3688	.2342	.4076	.2540	.4340	.2689	.4648	.2878
14				.2801	.3068	.3101	.2192	.3341	.2408	14		.3620	.2448	.3958	.3628	.4195	.2762	.4456	.2941
12		.2664	.2127	.2823	.2197	.3104	.2320	.3314	.2423	12		.3559	.2545	.3841	.2710	.4040	.2834	.4250	.2990
10		.2729	.2289	.2872	.2343	.3105	.2442	.3256	.2531	10		.3487	.2648	.3713	.2798	.3871	.2906	.4040	.3080
8		.2799	.2459	.2918	.2504	.3109	.2584	.3256	.2654	8		.3417	.2765	.3603	.2908	.3722	.2963	.3851	.3057
6		.2873	.2633	.2961	.2663	.3111	.2730	.3221	.2786	6		.3338	.2854	.3470	.2949	.3562	.3022	.3648	.3098
4		.2950	.2810	.3009	.2831	.3111	.2880	.3181	.2920	4		.3254	.2971	.3332	.3032	.3389	.3079	.3446	.3125
2		.3031	.3000	.3059	.3010	.3109	.3037	.3138	.3054	2		.3170	.3076	.3206	.3104	.3232	.3125	.3258	.3148
6/26	0.3005							.3457	.1604										
24						.3058	.1847	.3441	.1698	6/24	0.3005	.3927	.1892						
22						.3062	.1948	.3426	.1785			.3877	.1978	.4449	.2219				
20				.2702	.1621	.3069	.1745	.3409	.1882	20		.3833	.2056	.4368	.2283	.4735	.2464		
18		.2504	.1658	.2731	.1738	.3075	.1870	.3388	.1995	18		.3773	.2158	.4245	.2382	.4581	.2549	.4951	.2751
16		.2548	.1768	.2761	.1832	.3080	.1976	.3370	.2095	16		.3718	.2251	.4136	.2461	.4446	.2622	.4781	.2812
14		.2593	.1909	.2794	.1979	.3084	.2093	.3349	.2203	14		.3652	.2355	.4023	.2553	.4285	.2703	.4552	.2891
12		.2643	.2052	.2829	.2121	.3090	.2227	.3321	.2339	12		.3582	.2462	.3900	.2646	.4125	.2784	.4360	.2986
10		.2703	.2204	.2862	.2260	.3092	.2350	.3293	.2430	10		.3509	.2578	.3769	.2738	.3950	.2860	.4150	.2989
8		.2770	.2372	.2905	.2421	.3099	.2502	.3259	.2534	8		.3437	.2685	.3618	.2840	.3791	.2929	.3930	.3038
6		.2842	.2550	.2950	.2585	.3101	.2650	.3226	.2715	6		.3367	.2799	.3570	.2904	.3648	.2987	.3740	.3074
4		.2932	.2759	.3001	.2778	.3107	.2831	.3181	.2871	4		.3272	.2929	.3371	.3001	.3508	.3056	.3598	.3112
2		.3016	.2960	.3050	.2967	.3107	.2993	.3146	.3018	2		.3188	.3065	.3232	.3086	.3261	.3113	.3292	.3141
5/30	0.1977					.3010	.1170	.3400	.1368										
28						.3019	.1253	.3379	.1464										
26		.2318	.1140	.2618	.1135	.3022	.1331	.3368	.1460	5/26	0.1997	.4011	.1652						
24		.2372	.1223	.2682	.1204	.3030	.1423	.3350	.1535	24		.3965	.1738	.4683	.1978				
22		.2402	.1315	.2673	.1298	.3038	.1509	.3327	.1644	22		.3924	.1814	.4581	.2066	.5045	.2248		
20		.2436	.1419	.2694	.1499	.3052	.1606	.3322	.1735	20		.3873	.1909	.4484	.2150	.4918	.2330	.5306	.2535
18		.2476	.1532	.2716	.1604	.3052	.1711	.3301	.1840	18		.3821	.2004	.4372	.2242	.4761	.2431	.5158	.2620
16		.2515	.1644	.2744	.1718	.3050	.1830	.3282	.1951	16		.3763	.2108	.4261	.2331	.4617	.2506	.4936	.2695
14		.2560	.1774	.2775	.1847	.3066	.1951	.3360	.2066	14		.3703	.2211	.4142	.2428	.4454	.2596	.4767	.2776
12		.2608	.1913	.2806	.1977	.3071	.2080	.3335	.2187	12		.3635	.2325	.4022	.2534	.4303	.2675	.4570	.2841
10		.2655	.2075	.2845	.2137	.3090	.2240	.3308	.2328	10		.3560	.2452	.3880	.2540	.4108	.2773	.4332	.2918
8		.2728	.2240	.2885	.2296	.3087	.2375	.3280	.2464	8		.3490	.2570	.3768	.2779	.3937	.2857	.4105	.2980
6		.2806	.2444	.2932	.2487	.3093	.2555	.3243	.2630	6		.3396	.2718	.3585	.2842	.3726	.2941	.3851	.3039
4		.2898	.2667	.2986	.2699	.3100	.2750	.3198	.2807	4		.3298	.2860	.3421	.2934	.3515	.3024	.3594	.3090
2		.3000	.2912	.3045	.2928	.3103	.2959	.3148	.2986	2		.3199	.3019	.3256	.3065	.3296	.3098	.3332	.3131
4/32	0.1200	.2265	.0774	.2574	.0833	.2952	.0906												
30		.2285	.0847	.2588	.0907	.2959	.0979	.3410	.1080										
28		.2302	.0909	.2600	.0971	.2979	.1062	.3432	.1172										
26		.2322	.0978	.2618	.1052	.2986	.1135	.3428	.1248	4/26	0.1300	.4048	.1428						
24		.2348	.1062	.2635	.1132	.2993	.1225	.3421	.1337	24		.4011	.1504						

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6 CHROMA

“IT MAY SOUND STRANGE TO SAY THAT COLOR HAS THREE DIMENSIONS, BUT IT IS EASILY PROVED BY THE FACT THAT EACH OF THEM CAN BE MEASURED.”

6” x 10”