UNIVERSITY OF ILLINOIS PRESS

A Critical and Experimental Study of Colour Preferences
Author(s): H. J. Eysenck
Source: *The American Journal of Psychology*, Vol. 54, No. 3 (Jul., 1941), pp. 385-394
Published by: University of Illinois Press
Stable URL: http://www.jstor.org/stable/1417683
Accessed: 09-06-2015 18:54 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at http://www.jstor.org/page/info/about/policies/terms.jsp

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

University of Illinois Press is collaborating with JSTOR to digitize, preserve and extend access to *The American Journal of Psychology*.

http://www.jstor.org

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

A CRITICAL AND EXPERIMENTAL STUDY OF COLOUR PREFERENCES

By H. J. EYSENCK, University College, London, England

Experimentation in the field of colour preferences began comparatively early; Cohn's article in 1894 is generally regarded as the first definitely empirical approach to the various problems commonly subsumed under this heading.[1] Over 50 researches have been reported since that time, but little agreement has been reached even on the most fundamental points; namely, (1) the existence of a general order of preference for colours, (2) the relative popularity of saturated and unsaturated colours, and (3) differences in preferences for colours between the sexes.

(1) General preference. Cohn denied the existence of any general order of preference for colours; he found that among equally saturated colours preference depends exclusively upon individual taste.[2] Dorcus agrees with this statement to the extent of saying that in view of his results "we must be rather skeptical as to whether there is such a thing as colour preference."[3] More recently Von Allesch, laying great stress on the chaotic diversity of preferences among colours, maintained that results such as his were too variable to justify us in saying that any colours were in general pleasing or displeasing.[4] On the other hand, Walton, Guilford, and Guilford found "a common basis of feeling for different colours" among their observers, and they maintain that "there . . . remains sufficient agreement upon colour preferences to indicate a basic, biological cause of likes and dislikes for colours."[5] St. George,[6] and Garth[7] also argue in favour of native preference tendencies. Murray and Spencer noted that preferences remained constant even when backgrounds of varying colour were used.[8]

(2) Saturation-factor. As regards the relative popularity of saturated and unsaturated colours, Cohn found that the more saturated colours were generally preferred.[9] Walton and Morrison also found that "the saturated single colours were

* Accepted for publication September 26, 1940.

[1] J. Cohn, Experimentelle Untersuchungen über die Gefühlsbetonung der Farben, Helligkeiten und ihre Combinationen, *Philos. Stud.*, 10, 1894, 562-603.

[2] *Ibid.*, 599.

[3] R. M. Dorcus, Color preference and color association, *Ped. Sem.*, 33, 1926, 432.

[4] G. J. von Allesch, Die aesthetische Erscheinungsweise der Farben, *Psychol. Forsch.*, 6, 1924, 1-91.

[5] W. E. Walton, R. B. Guilford, and J. P. Guilford, Color preferences of 1279 university students, this JOURNAL, 45, 1933, 322-328.

[6] M. V. St. George, Color preferences of college students with reference to chromatic pull, learning, and association, *ibid.*, 51, 1938, 716.

[7] T. R. Garth, Color preferences of 559 full-blooded Indians, *J. Exper. Psychol.*, 5, 1922, 417.

[8] H. D. Murray and D. A. Spencer, *Colour in Theory and Practice*, 1939, 134.

[9] Cohn, *op. cit.*, 599.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

preferred."[10] Similar results were obtained by Jastrow,[11] Luckiesch,[12] Bradford,[13] and Minor.[14] Washburn, on the other hand, found that the affective value of tints was highest, shades next, and saturated colours lowest.[15] Major's results also did not confirm those reported by Cohn.[16] Titchener attempted to reconcile the opposing points of view by suggesting that there were two different types of observer, one type preferring the saturated colours, the other the unsaturated colours.[17] That such a type factor could only be of secondary importance is suggested by results obtained by Guilford, who found that of hue, tint, and chroma, "hue was the most important factor."[18]

(3) Sex difference. Many investigators have reported differences between the sexes in preferences for colours. Thus Dorcus found that "yellow has a lower affective value for the females than with the males;"[19] St. George maintains that blue for men stands out far more than for women;[20] and Jastrow found that women preferred red to blue, men blue to red.[21] Von Allesch, on the other hand, did not observe any such differences,[22] and Garth, after examining several thousand cases, came to the conclusion that "the color sequences between the two sexes are about the same."[23]

Opinions are sharply divided, then, on these three points. An attempt is made in this study to resolve these differences; both by means of an experimental investigation, and by means of a critical review of some of the more important researches. In the last part, the two sets of results are compared, and certain conclusions indicated.

EXPERIMENTS

Stimulus-colours. Ten Ostwald coloured papers were used, pasted onto cardboard without leaving a margin. The size of the papers was 5½ by 3½ in., and the colours were blue, red, green, violet, orange, yellow, all fully saturated; green, red, and orange tints; and a yellow shade.

Subjects. The *S*s were mostly university students, men and women in equal numbers. A few professional men and women were also included, and one or two artists.

---

[10] W. E. Walton and B. M. Morrison, A preliminary study of the affective value of colored lights, *J. Appl. Psychol.*, 15, 1931, 297.
[11] Joseph Jastrow, Popular esthetics of color, *Pop. Sci. Mo.*, 50, 1897, 361-368.
[12] M. Luckiesch, Note on color preference, this JOURNAL, 27, 1916, 251-256.
[13] E. J. G. Bradford, A note on the relation and aesthetic value of perceptive types in color appreciation, *ibid.*, 24, 1913, 545-554.
[14] A. Minor, Über die Gefälligkeit der Sättigungsstufen der Farben, *Zsch. f. Psychol.*, 50, 1909, 433-444.
[15] M. F. Washburn, Note on the affective value of colors, this JOURNAL, 22, 1911, 114-115.
[16] D. R. Major, On affective tone of single sense impressions, *ibid.*, 7, 1895, 57-77.
[17] E. B. Titchener, *Experimental Psychology*, 1, part II, 1901, 152.
[18] J. P. Guilford, Affective value of color as function of hue, tint, and chroma, *Psychol. Bull.*, 30, 1933, 679.
[19] Dorcus, *op. cit.*, 416.
[20] St. George, *op. cit.*, 716.
[21] Jastrow, *op. cit.*, 9.
[22] Von Allesch, *op. cit.*, 91.
[23] T. R. Garth, *Race Psychology*, 1931, 128.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

Procedure. Two separate experiments were carried out. In the first, 12 *Ss* were asked to rank the colours in order of preference. These rankings were then correlated, and the resulting table of correlations factor-analyzed. In the second experiment, 30 *Ss* were asked to rank the colours in order of preference; the average correlation between the rankings was found, and the average orders of the men and women were calculated separately.

RESULTS

In the first experiment, it was found that out of 66 correlations, only one was negative (-0.13 ± 0.33, or less than one-half its standard error).[24] All the other correlations were positive, nine being larger than twice their standard errors. The average of all the correlations in the table was 0.28.

We can calculate fom this coefficient the probable correlation of the average order of preference of our 12 *Ss* with the 'True Order,' *i.e.* the order of the whole population of which our *Ss* form only a sample, by means of a formula which I have shown elsewhere to be applicable to this kind of data.[25] This correlation has the value of 0.91. By reference to the table given in that article,[26] it can be seen that it would need 200 unweighted rankings to obtain an average that would correlate with the 'True Order' to the extent of 0.99.

Two factors were extracted from the table of correlations. The first factor, which had positive saturations throughout, accounted for 34% of the variance; the second bipolar factor accounted for 4%. The residuals on which this second factor was based were not statistically significant when tested by Fisher's test of the difference between the theoretical and actual correlations, expressed in terms of their inverse hyperbolic tangents ($z = \tanh^{-1}r$).

The amount of variance contributed by the first general factor in this test is larger than the percentage contributed by a general factor of intelligence in an analysis of the intercorrelations of 56 intelligence tests, carried out by the present writer.[27] Hence we may conclude that there is more agreement between the orders of preference for colours given by our *Ss*, than there is between the results of tests of intelligence of the kind used in that investigation.

The nature of this general factor of colour-appreciation can be eluci-

[24] Following the advice given by R. A. Fisher (*Statistical Methods for Research Workers,* 1932, 46), the standard error of each correlation is given, rather than the probable error.

[25] H. J. Eysenck, The validity of judgments as a function of the number of judges, *J. Exper. Psychol.,* 25, 1939, 650-654.

[26] *Op. cit.,* 653.

[27] Eysenck, Primary mental abilities: A critical review, *Brit. J. Educ. Psychol.,* 9, 1939, 273.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

dated by relating it to a general factor found in the analysis of 18 tests of aesthetic appreciation.[28] This factor, which was called 'T,' was shown to run through all the tests examined, and to correlate with general factors extracted from an analysis of the rankings of 64 polygons and 31 odours. On correlating the saturations of the 12 *Ss* taking part in the present experiment with their scores in a test of the 'T'-factor, a correlation of 0.53 was found, with a standard error of 0.22. It would appear, then, that the general factor of colour appreciation is saturated to the extent of 0.53 with the 'T'-factor, and hence the tentative explanation of the 'T'-factor given in my article may be suggested to apply to preferences for colours also.

The bipolar factor which appeared after the general factor had been eliminated was not significant, as mentioned above; but when the colours preferred by the *Ss* with the highest positive and negative saturations respectively were examined, it was found that this factor divided those who preferred pure, saturated colours from those who preferred unsaturated colours, *i.e.* tints and shades.

This finding is confirmed by the results of a similar experiment carried out by Mr. J. B. Parry, unpublished as yet. He had 15 *Ss* rank 24 Ostwald colours, 8 pure, 8 tints, and 8 shades. The average intercorrelation between the rankings was 0.21, and after the elimination of a general first factor which accounted for 26% of the variance, a bipolar factor was extracted, accounting for 13% of the variance and dividing those *Ss* who preferred pure colours from those who preferred the tints and shades. Both these and my own results are in entire agreement with the opinion expressed by Titchener[29] and with Cohn's later work.[30] Further confirmation will be found in the analysis of Von Allesch's data below.

In my second experiment, the average correlation between the rankings of the 30 *Ss* taking part was again 0.28; that is to say, the correlation between their average order and the 'true order' would be 0.96. The average rankings of the 15 men and the 15 women are given in Table I; in that table are also given the average rankings of the 12 *Ss* in the first experiment. Only the six pure colours are included in this table, for reasons which will later become obvious.

The rankings of the 15 men and the 15 women agree in placing blue, red, green, and violet above the two other colours; but they reverse

[28] Eysenck, The general factor in aesthetic judgments, *Brit. J. Psychol.*, 31, 1940, 94-102.
[29] Titchener, *op. cit.*, 151.
[30] J. Cohn, Gefühlston und Sättigung der Farben, *Philos. Stud.*, 15, 1900, 279-286.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

the position of yellow, which is preferred by the women, and orange, which is preferred by the men.

We may now summarize our findings so far under three headings: (1) On the average, agreement between rankings of colours is as high as agreement between tests of intelligence. (2) Two types are found in the population, one preferring saturated, the other unsaturated colours. (3) There are no sex-differences, apart from a slight preference of women for yellow over orange.

Discussion

(1) General preference. It might be said that the above conclusions are not based on large enough numbers of *Ss* to be very reliable. Such criti-

TABLE I

Average Rankings of Colour Preferences

Colour	Exper. 1	Exper. 2	
	12 Ss	15 men	15 women
blue	1.18	1.31	1.09
red	1.41	1.48	1.43
green	3.81	4.01	3.72
violet	4.71	4.37	4.56
orange	4.53	4.62	5.22
yellow	5.36	5.21	4.98

cism would leave out of account the very high correlations between the average orders and the 'true orders,' as calculated by means of the formula given in my article referred to above.[31] In view of the fact, however, that at least the first of our conclusions is in contradiction to the opinion of many experts, some doubt might still be felt with regard to the adequacy of the research. Accordingly, a review was made of previous investigations, in order to discover how far the above conclusions agree with the results of other investigators.

Recent opinion seems rather to have moved away from the view that there is an 'objective' order of colour preferences for human beings. Both Chandler[32] and Woodworth[33] cite with approval the work of Von Allesch, which according to Chandler "seems to render obsolete nearly all other work on the aesthetics of colour."[34] Von Allesch, as mentioned before, summed up his work by saying that the results were too variable to justify us

[31] *Cf.* footnote 25.
[32] A. R. Chandler, Recent experiments on visual aesthetics, *Psychol. Bull.*, 25, 1928, 720-732; *Beauty and Human Nature,* 1935.
[33] R. S. Woodworth, *Experimental Psychology,* 1938.
[34] Chandler, *op. cit., Psychol. Bull.*, 25, 1928, 720-732.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

in saying that any colours were in general pleasing or displeasing, and this opinion has since been endorsed by many others.

Chandler also attempted to show in another way the complete chaos, produced by the lack of agreement between different *Ss*' preferences. He assembled in the form of a synoptic table the results of a number of investigations, and pointing to the differences in the results argued that no objective order could be derived from them. Woodworth commented that the results in this table "leave a rather confused impression."[35]

Our task, then, will be twofold. First, we must examine the results reported by Von Allesch, in order to see whether it is impossible to reconcile them with our own; and secondly, we must bring together the results of the various investigations that have been carried out so far, and determine the exact amount of agreement between them.

Von Allesch bases his conclusions largely on a table giving the preference judgments of 10 *Ss*.[36] He does not report any statistical treatment of his data, but seems to have relied on casual inspection entirely. Fortunately his results are given in full enough detail to make a statistical analysis possible.

I have correlated the rankings of the 10 *Ss*, and factor-analysed the resulting table of correlations. The majority of the correlations in this table are positive, only one in seven being negative. None of the negative correlations are statistically significant. The average of all the correlations in the table is 0.26, *i.e.* practically the same as that found in my own research. A general factor is the first to be extracted from this table; it contributes 30% to the variance. A second factor, accounting for 12% of the variance, divides the *Ss* roughly into those who prefer pure colours, and those who prefer tints and shades.

Thus it appears that Von Allesch's results are essentially identical with my own, both as regards amount of agreement between the *Ss*, and as regards the nature of the factors determining the judgment of the *Ss*. In view of the high praise that Von Allesch's work has generally received, support from this quarter is most gratifying.

As regards the alleged lack of agreement in the results of different investigators, we must first consider the fact that they were not working with the same materials. Some used coloured papers of one kind or another, others used dyed wools or velvets, coloured lights, coloured crayons, or simply colour names in their experiments. As Exner has shown, how-

[35] Woodworth, *op. cit.*, 382.
[36] Van Allesch, *op. cit.*, 13.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

ever, one blue is not necessarily equivalent in pleasantness to another blue, or one red to another red;[37] hence one should not expect complete agreement between the various investigators. If there was no agreement at all, of course, our case would be seriously weakened, if not wholly destroyed.

There are great differences in the numbers of colours used, and in the choice of those included. Nearly all investigators, however, have included highly saturated blue, red, green, violet, orange, and yellow among their colours. Hence an average ranking was calculated for these six colours from the results reported by Katz and Breed,[38] Walton and Morrison,[39] Jastrow,[40] Cattell and Farrand,[41] Walton, Guilford and Guilford,[42] Luc-

TABLE II

AVERAGE RANKINGS OF COLOUR PREFERENCES OBTAINED IN THE VARIOUS EXPERIMENTS

Colour	White Ss (12,175)	Coloured Ss (8885)	Weighted total (21,060)
blue	1.12	1.83	1.42
red	2.32	2.03	2.20
green	3.32	2.98	3.18
violet	3.66	4.28	3.92
orange	5.30	4.76	5.07
yellow	5.28	5.12	5.21

kiesch,[43] Fernberger,[44] Miles,[45] St. George,[46] Washburn,[47] Farnsworth and Chichizola,[48] Dorcus,[49] Garth,[50] Hunlock,[51] Parry (unpublished results) and by myself in the previous section. These investigations only deal with white *Ss*; a separate ranking was calculated for coloured *Ss* from

[37] F. Exner, Zur Charakteristik der schönen und hässlichen Farben, *Kön. Akad. d. Wissensch., Wien; Sitzbericht d. Mathem. Naturwiss. Klasse,* 3 Abt., 1902, 901-922.

[38] S. E. Katz and F. S. Breed, Color preferences of children, *J. Appl. Psychol.,* 6, 1922, 255-266.

[39] *Op. cit.*

[40] *Op. cit.*

[41] J. McKeen Cattell and Livingston Farrand, Physical and mental measurements of Columbia University students, *Psychol. Rev.,* 3, 1896, 618-648.

[42] *Op. cit.*

[43] *Op. cit.*

[44] S. W. Fernberger, Note on affective value of colors, this JOURNAL, 25, 1914, 448-449.

[45] C. Miles, Individual psychology, *ibid.,* 6, 1895, 534-558.

[46] *Op. cit.*

[47] *Op. cit.*

[48] P. R. Farnsworth and Y. L. Chichizola, Color preferences in terms of sigma units, *ibid.,* 43, 1931, 631.

[49] *Op. cit.*

[50] T. R. Garth, A color preference scale for one thousand white children, *J. Exper. Psychol.,* 7, 1924, 233-241.

[51] E. B. Hunlock, Color preferences of white and negro children, *J. Comp. Psychol.,* 7, 1927, 389-404.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

the results reported by Mercer,[52] Garth,[53] Garth, Moses, and Anthony,[54] Garth, Iheda, and Langdon,[55] Chou and Chen,[56] Gesche,[57] Shen,[58] Imada,[59] Mizuguchi and Arki,[60] and Hunlock.[61] The rankings given in each

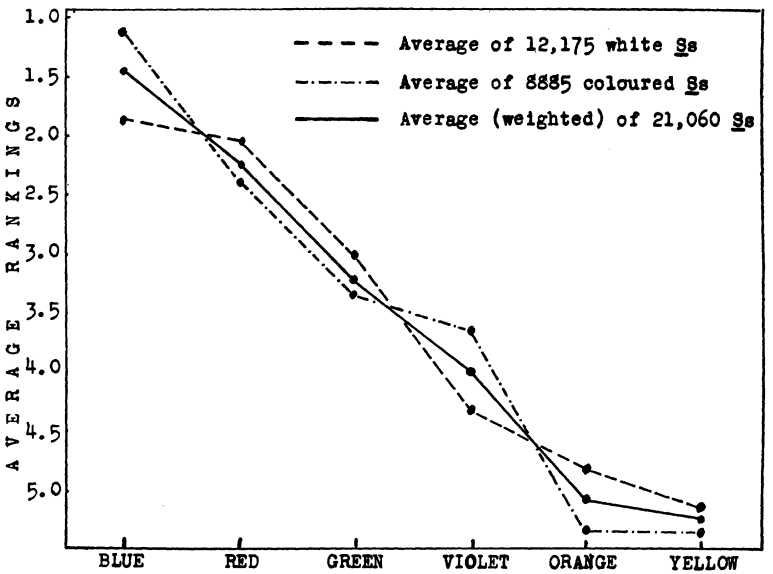

FIG. 1. AVERAGE RANKINGS OF COLOUR PREFERENCES

of these investigations were weighted by the number of *Ss*. The results are given in Table II.

The correlation between the average marks given to the various colours by the white and coloured *Ss* repectively is 0.96; hence we concluded with

---

[52] F. M. Mercer, Color preferences of 1006 Negroes, *ibid.*, 5, 1925, 109-146.
[53] *Op. cit.*, footnote 7.
[54] T. R. Garth, H. R. Moses, and C. N. Anthony, The color preferences of East Indians, this JOURNAL, 51, 1938, 709-713.
[55] T. R. Garth, K. Iheda, and R. M. Langdon, Color preferences of Japanese children, *J. Soc. Psychol.*, 2, 1931, 397-402.
[56] S. K. Chou and H. P. Chen, General versus specific preferences of Chinese students, *ibid.*, 6, 1935, 290-314.
[57] I. Gesche, Color preferences of 1152 Mexican children, *J. Comp. Psychol.*, 7, 1927, 297-311.
[58] N. C. Shen, A note on the color preferences of Chinese students, *J. Soc. Psychol.*, 7, 1936, 68-81; The color preference of 1368 Chinese students, with special reference to the most preferred color, *ibid.*, 8, 1937, 185-204.
[59] M. Imada, Color preferences of school children, *Jap. J. Psychol.*, 1, 1926, 1-21.
[60] F. Mizuguchi and S. Arki, Color preference of adults, *ibid.*, 22-37.
[61] *Op. cit.*

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

Garth that "there are no racial differences in colour preferences."[62] As there is no reason to keep the two rankings apart, a weighted total ranking is calculated which is also given in Table II. Fig. 1 represents diagrammatically these three rankings; it will be noted that the line representing the ranking of the total groups is almost straight till it breaks at the orange.

(2) Agreement among investigators. To determine how high the agreement was between the various investigators, the rankings given by them were correlated with the total average order. These correlations give us unweighted saturations, which are identical with weighted saturations if no more than one general factor is present. As we have already seen that among saturated colours there is no secondary factor, this method gives

TABLE III

AVERAGE RANKINGS OF COLOUR PREFERENCES OF MEN AND WOMEN

Colour	7,378 men	6,247 women
blue	1.45	1.68
red	2.47	2.50
green	2.53	2.52
violet	4.36	4.14
orange	4.94	5.13
yellow	5. 5	5.03

us the saturations of the various rankings in a far less laborious way than by means of a formal factor-analysis.

The average saturation of the rankings produced by the white *Ss* is 0.82; the average saturations of the rankings produced by the coloured *Ss* is 0.72. The agreement between the various investigators, then, is very high indeed, and we cannot accept Chandler's dictum that there is a complete lack of agreement.

(3) Sex differences. We turn next to the question of sex differences. Using a similar method to that reported above, 17 investigations giving average orders for men, and 16 investigations giving average orders for women were examined, and total averages calculated for the orders of the two sexes separately, suitably weighted by the number of *Ss*. Two reports were included which have not been mentioned yet; namely, those by Geissler[63] and Hiroshashi.[64] The results are given above, in Table III.

The correlation between these two orders is 0.95; as in our own investi-

[62] Garth, *Race Psychology,* 1931, 135.

[63] L. R. Geissler, The affective tone of color-combinations, *Studies in Psychology; Titchener Commemorative Volume,* 1917, 150-174.

[64] B. Hiroshashi, Some experiments in beauty of color, *Jap. J. Psychol.,* 1, 1926, 406-432.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions

gation, the only reversal is in the case of orange and yellow, orange being preferred to yellow by the men, yellow to orange by the women. Otherwise, preferences are very similar between the sexes.

The results reached so far enable us to suggest, at least tentatively, a possible basis for the universal scale of preferences we have encountered. Two such bases, in fact, offer themselves. First, it is found that preference for any colour varies inversely with the luminosity factor of that colour.[65]

Secondly, there is a direct relation between liking for a colour and its 'differentiation' from white, as shown by the minimum amount of spectral colour that must be added to the test field before it is seen to differ from white.[66] It must be left to further research to show whether this agreement between preferences and the two factors mentioned is really indicative of a causal connection. The agreement seems rather striking for it to be due merely to accident.

Summary and Conclusions

Three questions were investigated, all connected with preferences for simple colours. The results of the experiments agreed with a critical re-assessment of the results reported by other investigators. These results were:

(1) There is a certain amount of agreement between the colour preferences of people. This agreement is as high as that between intelligence tests; it is not restricted to Europeans, but also found among coloured races; and it is connected with a general factor of aesthetic appreciation discussed elsewhere.

(2) Subsidiary to this general factor of preference for colours is a bi-polar factor, which divides those who prefer saturated colours from those who prefer unsaturated colours, *i.e.* tints and shades.

(3) There is high agreement between the two sexes with regard to their colour preferences. Apart from a slight preference for orange among the men and for yellow among the women, the average orders given by the two sexes are identical, the correlation between them being 0.95.

[65] The brightness at any wave-length relative to that at 5550 A.U. along the equal energy spectrum is known as the luminosity factor, Cf. Murray and Spencer, *op. cit.*, 89.

[66] *Ibid.*, 91.

This content downloaded from 140.211.127.19 on Tue, 09 Jun 2015 18:54:00 UTC
All use subject to JSTOR Terms and Conditions