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THE PUZZLE OF COLOR VOCABULARIES.

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It was Gladstone¹ who first, in 1858, called attention to the rather extraordinary vagueness of early color nomenclature. Collating from the Iliad and Odyssey the passages which referred to color, he found such uncertainty and inconsistency in the application of color names as to lead him to deny to the Greeks of Homeric times any clear notions of color whatever. "I conclude," he says, "that the organ of color and its impressions were but partially developed among the Greeks of the heroic age."

This hypothesis of Gladstone was made more precise and given a definite evolutionary character by Geiger,² who, extending the study to many ancient literatures, found them all defective in the same respect; they all showed a lack of any clear term for blue, and the oldest of them had also none for green. Speaking of the Vedas, Geiger says:³

"These hymns, consisting of more than 10,000 lines, are nearly all filled with descriptions of the sky. Scarcely any subject is more frequently mentioned; the variety of hues which the sun and dawn display in it, day and night, clouds and lightnings, the atmosphere and the ether, all these are with inexhaustible abundance exhibited to us again and again in all their magnificence; only the fact that the sky is blue could never have been gathered from these poems by any one who did not already know it himself. . . . The *Bible*, in which, as is equally well known, the sky or heaven plays no less a part, see-

¹ *Studies on Homer and the Homeric Age*, III., 457-499.

² *Contributions to the History of the Development of the Human Race*, translated by D. Asher, London, 1880.

³ *Ibid.*, pp. 50-61.

ing that it occurs in the very first verse, and in upwards of 430 other passages besides . . . yet finds no opportunity either of mentioning the blue color.

“The color *green* is met with in antiquity one stage farther back than the blue. . . . The ten books of Rigveda hymns, though they frequently mention the earth, no more bestow on it the epithet green than on the heavens that of blue.”

In the very earliest literary remains, according to Geiger, there is not even a name for pure yellow, though there is one for golden or reddish yellow; red appears more firmly entrenched than yellow. And, by aid of etymology, the author believes it possible to go back of even the earliest literature, and “arrive at a still earlier stage, when the notions of black and red coalesce in the vague conception of something colored.”

Following his general doctrine that the development of the human mind can be traced by aid of the history of language, Geiger concludes that in an early stage of human development, only a vague sense of indefinite color existed; that red first took on the character of a definite sensation, and that the other colors followed in the order of the spectrum.

The views of Geiger were warmly espoused by Magnus,¹ who, besides attempting to trace a gradual evolution in the use of color names in Greek literature, took the important step of examining, on a wide scale, both the color vocabularies and the color sense of existing primitive peoples. As a result of a questionnaire, with a set of colors to be named and distinguished, sent out to traders and missionaries, Magnus discovered that most primitive tribes possessed a color nomenclature which was incomplete in about the same way as that of Homer or of the Vedas. But he also found that the limits of color vision were the same among these tribes as among Europeans. They could see and distinguish all the colors from red to violet, though usually they did not possess names for them all. This discrepancy between color vision and the color vocabulary was in itself an important discovery, since it betrayed the weak foundation of the philological method.

This same discrepancy, however, was not only a discovery, but also a problem. Why should color nomenclature not be fairly adequate to the development of the color sense, and why should it be so much further advanced among some peoples than among others? In particular, the uniform character of the deficiency constituted a problem.

¹*Die geschichtliche Entwicklung des Farbensinnes.* Leipzig: 1877.
Untersuchungen über den Farbensinn der Naturvölker. Jena: 1880.

Magnus was able to establish definite laws governing the growth of color vocabularies. Color nomenclature begins, almost always, with red, and spreads to the other colors in spectral order, usually however skipping transitional colors such as orange, blue-green and violet. Practically every language has a name for red; nearly all have a name for yellow; but comparatively few have a conventional word for green, and still fewer have one for blue. Neighboring colors, especially green and blue, are sometimes called by the same name. Where a name for blue is absent, a blue, or at least a saturated blue, is very commonly called by the name which seems primarily to designate black or dark or dull. These results of Magnus's inquiry, which have been generally confirmed by later observations, certainly set a pretty problem in folk psychology.

The observations of Rivers, on both the color vocabulary and the color sense of several primitive groups, are probably the most accurate and important which we possess. He has examined four peoples by a constant method: the Egyptian peasants,¹ the Papuans of Torres Straits,² the Uralis and Sholagas of India,³ and the Todas of Southern India⁴; and also a number of whites (English) for purposes of comparison.

Among the natives of Torres Straits he found four stages in the development of a color vocabulary represented in different islands. Some of these stages he has also found exemplified in Egypt and India. "In the lowest there appears only to be a definite term for red apart from white and black; in the next stage there are definite terms for red and yellow, and an indefinite term for green; in the next stage there are definite terms for red, yellow and green, and a term for blue has been borrowed from another language; while in the highest stage there are terms for both green and blue, but these tend to be confused with one another." This highest stage differs but slightly from that of popular language in Europe.

To complete this account of the different stages of color nomenclature, it should be added that some languages have no conventional color names at all. Some American Indian languages show this peculiarity;⁵ the color of any presented object will be said to be like

¹ *Journal of the Anthropological Institute*, 1901. Vol. 31, p. 239.

² Reports of the Cambridge Anthropological Expedition to Torres Straits, 1901. Vol. 2, p. 48.

³ *Bulletin Madras Government Museum*, 1903. Vol. 5, p. 3.

⁴ *Brit. Journ. of Psychol.*, 1905. Vol. 1, p. 326; this article contains a brief summary of all his results on color sense; see also his article in the *Pop. Science Monthly*, 1901. Vol. 59, p. 48.

⁵ So I am informed by Professor F. Boas.

that of some other object, and such comparisons are often very accurately made; but there is an absence of fixed usage as to what objects shall constitute the standards for comparison, so that color language remains in a fluid state. Rivers observed much the same fact in the naming of certain colors by the natives of Torres Straits. Probably we shall be right in recognizing several stages in the establishment of a color name: in the first stage comparisons are fluid and there is no fixed usage; in a later stage usage centers about some one comparison, so that all objects having a certain (approximate) color are said to have the color of one particular object; in a later stage, as described by Wundt,¹ the name becomes abstract in the sense that the object is no longer thought of when its name is used as the designation of a color; and later still the name may chance to become obsolete as applied to the object and remain exclusively as the name of the color. Obsolescence of the original usage of the name is probably a purely incidental feature, but is of interest, when it occurs, as showing antiquity of the color meaning.

Fixity of usage depends probably on frequency; where the need for designating a certain color, or range of colors, is infrequent, the fluid condition of color designation will be adequate, and no occasion will arise for stereotyping the name or for dissociating its color meaning from its reference to a particular object. It is evident that growing fixity of usage by no means indicates a finer sensitivity to differences in color, since each stereotyped color name covers a considerable range of discriminable colors. For this reason the original fluid method of color designation persists alongside of the fixed usage, and is employed especially by those who need to designate colors more precisely than is accomplished by the use of the conventional names.

Another fact which has not hitherto been introduced into the discussion of color vocabularies concerns the richness of European languages in names for different parts of the spectrum. The fact is that the English language, for example, is much richer in abstract names for the colors toward the red end of the spectrum than for colors toward the violet end. The following list includes all the color names which I have been able to find in modern English, in which the color reference is thoroughly dissociated, in common usage, from reference to any specific object.

For the reds and yellows and their various shades: red, ruddy, rubicund, russet, roan, auburn, carmine, crimson, scarlet, brown, bay, sorrel, dun, yellow, tawny, sallow, lurid. (To these might be added

¹*Völkerpsychologie*, 1900, Bd. I, Th. 2, pp. 512-515.

buff, maroon, vermilion, and perhaps such words as magenta, since the objects to which these names primarily refer are not known by most persons who use the names.)

For the greens, blues and violets: green, verdant, blue, azure, purple, livid.

To the fact that names for red and yellow develop first in the history of a language should therefore be added the fact that they predominate in the European languages.¹ It is further to be noted that many of the names for shades of red and yellow are applied mostly to men and animals. Apparently there is some special demand for names of animal colors. Magnus reports that the Kaffirs have over thirty words and expressions to designate the colors and markings of cattle; and regarding another people of herdsmen, the Ovaherero or Damara of Southwest Africa, his informant makes the following suggestive statement:²

"Colors that coincide with those of cows, sheep and goats, they name without difficulty; but whatever is not a color of cattle, particularly blue and green, they cannot name, although they can distinguish them from the other colors, and when necessary use foreign words to designate them. . . . Those who have not come into contact with foreign culture and foreign names cannot name green and blue, and think it highly amusing that there should be names for these colors." It would indeed be ridiculous to have names for colors simply because the colors were distinguishable.

With these facts of color language before us, we may turn to the problem of explanation. At the outset, it is clear that no such view as that of Geiger can longer be entertained. The absence of a name for a sensory quality does not point to the absence of the quality. The case of smell is particularly convincing, for certainly many odors are vivid experiences, likely to attract the attention and be, relatively, isolated from a total sensory complex, and often they are practically significant; and yet there is an almost complete absence of abstract odor names from all languages. Taste nomenclature, though better defined

¹ This same predominance of red and yellow appears in the Greek and Latin languages. (See W. Schultz, *Das Farbenempfindungssystem der Hellenen*. Leipzig: 1904, pp. 83, 95.) The Greek was superior to English in possessing well-marked names for yellowish green (*χλωρός*) and for a more bluish green (*πράσινος*). It also, apparently, employed several names for blue, distinguishing light from dark blue; but the exact usage is here difficult to determine. *Κυανός* was apparently applied both to deep blue and to dark gray objects, and this is one of the 'confusions' which have led repeatedly to the conclusion that the Greeks were deficient in the color sense.

² Magnus, *Farbensinn der Naturvölker*, p. 9.

than that of smell, presents some striking incongruences with taste sensation, as has been shown by Myers¹ and by Chamberlain.² Many languages do not possess four words to correspond to the four tastes (which, it can hardly be doubted, are the property of all races of men), and even where the language is complete in this regard, common usage often employs one taste word to refer to substances of discrete tastes. In its most rudimentary condition, a taste vocabulary consists simply of words for well-tasting and ill-tasting; and in more developed languages this affective basis of taste nomenclature is still visible. Sweet and mildly saline are often called by one name; and sour and bitter by one name. Even Scotch villagers, examined by Myers, described a weak solution of quinine as having 'a sort of sour' or a 'sort of salty' taste. It is the exception, rather than the rule, when any sensation, either elementary or complex, receives a special name.

Magnus, as the result of his inquiry, was forced to abandon the doctrine of a close correspondence between color sense and the color vocabulary; but it still seemed to him impossible to explain the deficiency of names for green and blue without assuming some underlying sensory defect; and he is inclined to the view that these sensations, though present in primitive folk, were perhaps of recent development and certainly less vivid and impressive than to European eyes. Their lack of vividness, he supposed, was the cause of their remaining nameless.

This more moderate form of the Gladstone-Geiger hypothesis, though practically obsolete for two decades, has come into renewed prominence through the support of Rivers. Though this author admits the existence of other factors in the development of color language, he regards a lack of vividness of the sensation of blue as of great importance. This conclusion seems to him to be indicated by the results of his measurements of the sensitiveness of different peoples to colors. His measurements determined the faintest tint of red, yellow and blue which could be recognized and named. His results on four primitive peoples, as compared with the English, show average thresholds for the five groups which are in fairly close agreement, with the following exceptions. The English have a much lower threshold for yellow and for blue than any of the more primitive groups; and one of his primitive groups (the Murray Islanders) show a much lower threshold for red than either the English or any of the remaining groups.

¹ 'The Taste-names of Primitive Peoples,' *Brit. Journ. of Psychol.*, 1904, Vol. I., p. 117.

² 'Primitive Taste Words,' *Amer. Journ. of Psychol.*, 1903, Vol. 14, p. 146.

The only one of these differences which is emphasized by Rivers is the greater sensitiveness of the English for blue. This seems to him of importance as showing that the absence of a name for blue is actually associated with a certain degree of insensitiveness for this color. The low threshold of the English for *yellow* does not impress him as significant, and yet, though it is less marked than their low threshold for blue, it cannot be explained by the probable error of his observations, but is, on the contrary, rather striking. It creates some difficulty in the way of using the facts in explaining color nomenclature, since the name for yellow is present, though the sensitiveness to that color is comparatively blunt.

A more serious difficulty with Rivers' results is that so much depends on the group of 41 educated Englishmen whose average gives the basis for comparison.

The individuals in this group differed greatly from each other in sensitiveness to the colors. Rivers ascribes this variability, in case of red, to the probable presence in the group of some individuals with a tendency to red-green blindness — though demonstrably color blind individuals were of course excluded — and in the case of blue, to the possibility that some of his Englishmen helped out sensation by inference, calling a glass blue when they did not detect either of the two more easily recognized colors. It is possible, accordingly, that the English threshold for red is too high, and for blue too low, to compare fairly with the thresholds of the primitive groups; and, if so, the corrected result would read simply that the English were able to recognize and name fainter tints than the other races tested. Such a result might well be due to a better adaptation of the educated subjects to the conditions of the test, and to their greater habituation to analyzing and naming pale colors.¹

Rivers himself accepts the low sensitivity of his primitive groups to blue as a well-established fact, and offers alternative explanations for it. One of his suggestions is new and deserves careful attention. "The Murray Islander," he says, "differs from the Englishman in two

¹ That this statement represents the true state of the case, I am strongly inclined to believe, on the basis of tests of several more or less primitive peoples made by Dr. Bruner and myself at the St. Louis Exposition. Publication of the full results of our work has been unduly delayed; and I will simply state that our test called for fine discrimination of color tones, instead of the recognition of pale tints, and is therefore, in strictness, not comparable with that of Rivers. At the same time, we found, clearly enough, that all the primitive peoples were inferior to white Americans in this test, but that the inferiority was no more marked in the blues than in the reds and yellows. Some of these primitive people, however, possess no names for green and blue.

important respects; he is more primitive and he is more pigmented, and his insensitiveness to blue may be either a function of his primitiveness or of his pigmentation. In other words, it is possible that his insensitiveness may depend on the lack of development of some physiological substance or mechanism, which acts as the basis of the sensation blue in ourselves, or it may only depend on the fact that the retina of the Papuan is more strongly pigmented than that of the European. There is some reason to think that this latter factor is the more important. We know that the macula lutea in the retina, which contains the region of most distinct vision, is pigmented, and that as a consequence of the reddish-yellow color of its pigment, blue and green rays are more strongly absorbed than red and yellow; we have reason to believe further that the macula of dark races is more pigmented than that of ourselves. The consequence would be that, in dark races, blue and green would be more strongly absorbed, and consequently there would be a certain degree of insensitiveness to these colors, as compared with red and yellow."¹

This suggestion regarding retinal pigmentation is the more deserving of attention since Lindsay Johnson² has reported his ophthalmoscopic examinations of the fundus oculi in various races, and shown that the color of it ranges from orange-red in fair-haired Europeans to dark chocolate in the negro. What effect these differences in pigmentation should have on color vision, however, remains to be worked out. Meanwhile, this suggestion by no means contains a full explanation of the peculiar order of growth of color vocabularies, since this order has apparently been the same in light-skinned as in dark-skinned races. Even the Welsh language of today, according to Rivers, has no word for blue.³ The late appearance of names for green and blue is too wide-spread a phenomenon to be explained in terms of racial differences.

Now, finally, to make an attempt at a positive explanation of the puzzle of color vocabularies. The matter now appears to me — after several years of consideration — rather simple and devoid of psychological interest, except perhaps from its bearing on the methods of folk psychology. We may fairly assume, with Wundt,⁴ that abstract color names are of relatively late introduction into any language, and that they developed out of names for colored objects; so that the question is primarily regarding that hardening and dissociation of

¹ *Pop. Science Monthly*, 1901. Vol. 59, p. 52.

² *Philos. Trans. Roy. Soc. London*, 1901, ser. B, Vol. 194, p. 1.

³ *Op. cit.*, p. 48.

⁴ *Loc. cit.*

linguistic usage of which mention was previously made. What requires explanation is rather the development of this fixity of usage than its absence; some need for it must be pointed out, and this need must, undoubtedly, include frequency of reference to the color.

It is further evident that the color implication of the name of an object would never be dissociated from the whole connotation of the name, if there existed no other object of similar color, to which there was frequent need to refer. A color name can scarcely develop except where there are a variety of objects of the same general color.

A further necessity is brought into view by considering the function of color in practical and primitive life. The color of an object is not a practically important character, except as a ready means, and often the readiest means, of identifying the object and distinguishing it from its background. It is where color serves as the mark of an important object, or condition of an object, that a color name would be most likely to develop. But a color name need not always develop even in these circumstances, for practical tendencies lead us to pass quickly from a sign to the thing signified, and to speak of the thing signified rather than of the sign. We speak of a gray patch in the sky as a cloud, of a red spot on the skin as blood; we speak of a berry as ripe rather than red, of a knife as rusty rather than brown, of meat as well done or underdone rather than as brown or red. In such cases the color is the mark by which the condition of the thing is known, but what is named is the condition rather than the mark.

Such considerations make clear the lack of a need for color names, and account for the widespread poverty of languages in such names. They also help to explain why red and yellow are so much more generously supplied with names than green and blue.

Green and blue, in nature, are predominantly background colors, while red and yellow are usually the colors of small objects contrasting with the background and recognized most readily by their color. More than this, red and yellow are the usual colors of such important objects as ripe fruits, domestic animals, wild animals to be hunted or avoided, blood and flesh. It is as animal colors, and particularly as mammalian colors, that red and yellow, with their darker shades, are most important to primitive man; and it would be hard to point out any equal importance of green and blue. Particularly in distinguishing cattle from one another, for purposes of barter, or for many other purposes of the herdsman, is it necessary to use the color as a mark, and to designate an individual by its color. If cows had affected the blues and greens, the history of color vocabularies would probably have been

quite different. It is also true¹ that the most accessible and most used pigments are red and yellow, and the use of pigments might easily give rise to a variety of objects alike save in color and needing to be designated by reference to their color. Probably the exact history of names for red and yellow has been different in different tribes.

Needs for the names of red and yellow are thus not far to seek, but the case is different with green and blue. It would be hard to show wherein primitive man suffers inconvenience from lack of names for green and blue. He needs, indeed, to observe and speak of the difference between growing and ripe or dead vegetation, but names for ripe and unripe, fresh and dried, living and dead supply this need admirably, and have the advantage of sticking close to the inner conditions indicated by the color signs. Similarly, primitive man needs to observe and speak of the difference between a blue and a gray sky, but weather names supply this need. We ourselves abandon our color names when speaking of the sky in a practical connection. We are unlikely to refer to it as deep blue, or grayish blue, or mottled blue and gray, or uniformly gray, when what we mean is that it is clear, hazy, fair or overcast. So long as vegetation and the sky are the only objects in which the colors green and blue are of practical importance, no motive can be assigned for the use of special names for these colors. And it is hard to think of other objects of these colors—especially of blue—which are important in primitive conditions. With the introduction of green and blue paints and dyes, these colors become important marks in distinguishing household objects; and it is probably owing to the use of pigments that names for green and blue have become stereotyped in European languages.

¹ Cf. Rivers, *Pop. Sci. Mo.*, 1901, Vol. 59, p. 56.