THIS COLOUR BUSINESS

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IT IS often said that no two people see colours in exactly the same way and there is a modicum of truth in this, but not much more. Unless we are colour-blind we can all tell that red is red and blue is blue, but we may differ in deciding which red or blue it is. And if the colour is a purple one the difficulty is increased.

What then is colour? It is an intangible property of all substances, but cannot exist of itself and is therefore subjective. There must be an object concerned. Colour depends entirely on the light falling on this object and varies with this incident light; change it and the colour changes; remove it and the colour goes and we can no longer see the object. Notice how the colours of substance out of doors change as the sun sets and how a stamp differs in colour in daylight and in artificial light.

White daylight can be broken up, by passage through a prism, into seven different coloured rays: red, orange, yellow, green, blue, indigo and violet. These all have different wave-lengths and each can be defined by this factor. When these rays fall on an object (such as a stamp) some are absorbed and only those reflected to our eyes (or to a suitable machine such as a spectrophotometer) give us the impression of colour. Thus a stamp printed in an ink which is able to absorb all the light rays except those corresponding to the blue part of the spectrum appears blue in colour. But put it under an orange light and there would be no blue to reflect and it would appear black. A body which absorbs all the rays of the spectrum appears black and one that reflects them all is white.

Greys are produced in a somewhat different way. Some light of each wave-length is absorbed and some reflected. The more an object absorbs, the darker the grey.

Every colour has qualities of *hue*, *value* and *chroma*. *Hue* refers to the visual sensation produced by light according to its wave-length. In analysing and describing any specific sensation, unless a well-known name is ready to hand, the name of the basic sensation (spectrum colour) is used and qualified by appropriate adjectives and adverbs. Thus we may have red, pale red, pale dull red, bright shiny red, etc.

Value is synonymous with luminosity, brightness, lightness, brilliance, etc. In the spectrum yellow has the highest value and blue-violet the lowest. Value is determined by comparison with a scale graduated from black to white—the extremes of value. A colour gains in brilliance in proportion to the amount of colour higher in the scale that is added to it—within limits. Thus we might have a blue colour; addition of yellow to the ink (let us assume we are referring to a stamp) would increase the brilliance, but only to a certain limit which is reached just before it becomes blue-green, another distinct colour. More yellow can be added to green than to blue as green is closer to it in the spectrum. Changes of value can also be caused by adding black or white; white increases value and produces a *tint*; black decreases value and produces a *shade*.

Chroma refers to the purity of a colour and is synonymous with strength, saturation, intensity, vividness, etc. It indicates the amount of adulteration with another colour or with black or white. Addition of black lowers the chroma and eventually produces a grey. A middle grey is much nearer to black than to white, reflecting as it does only about 14 per cent. of the light received compared with 98 per cent. for white and 2 per cent. for the best black. Although black and white are not really colours in the same sense as the others they are usually referred to as such.

The term *primary colour* is used for one not produced by a mixture of any other colours and by it the painter or colour printer usually understands red, yellow and blue. Mixtures of any two of these give the *secondary colours*, orange, green and purple. The *tertiary colours* such as brown, olive, and slate, are obtained either by mixing the primaries in different proportions or by degrading them with black. Thus brown can be made from purple (red and blue) and yellow or from red and black. Yet every green (e.g. viridian) cannot be produced by mixing blues and yellows and so they cannot all be considered as secondary colours. With inks and lights it is possible to produce certain reds, blues, and yellows from combinations of greens, oranges, and violets, and so these could be considered secondary, instead of primary if produced in this way. A physicist would probably consider the primary colours to be red, green and blue-violet. *Complementary colours* are those such as red and green which when mixed produce a neutral grey: complementary lights on the other hand when mixed produce a white light, each one being short of the colour the other contains.

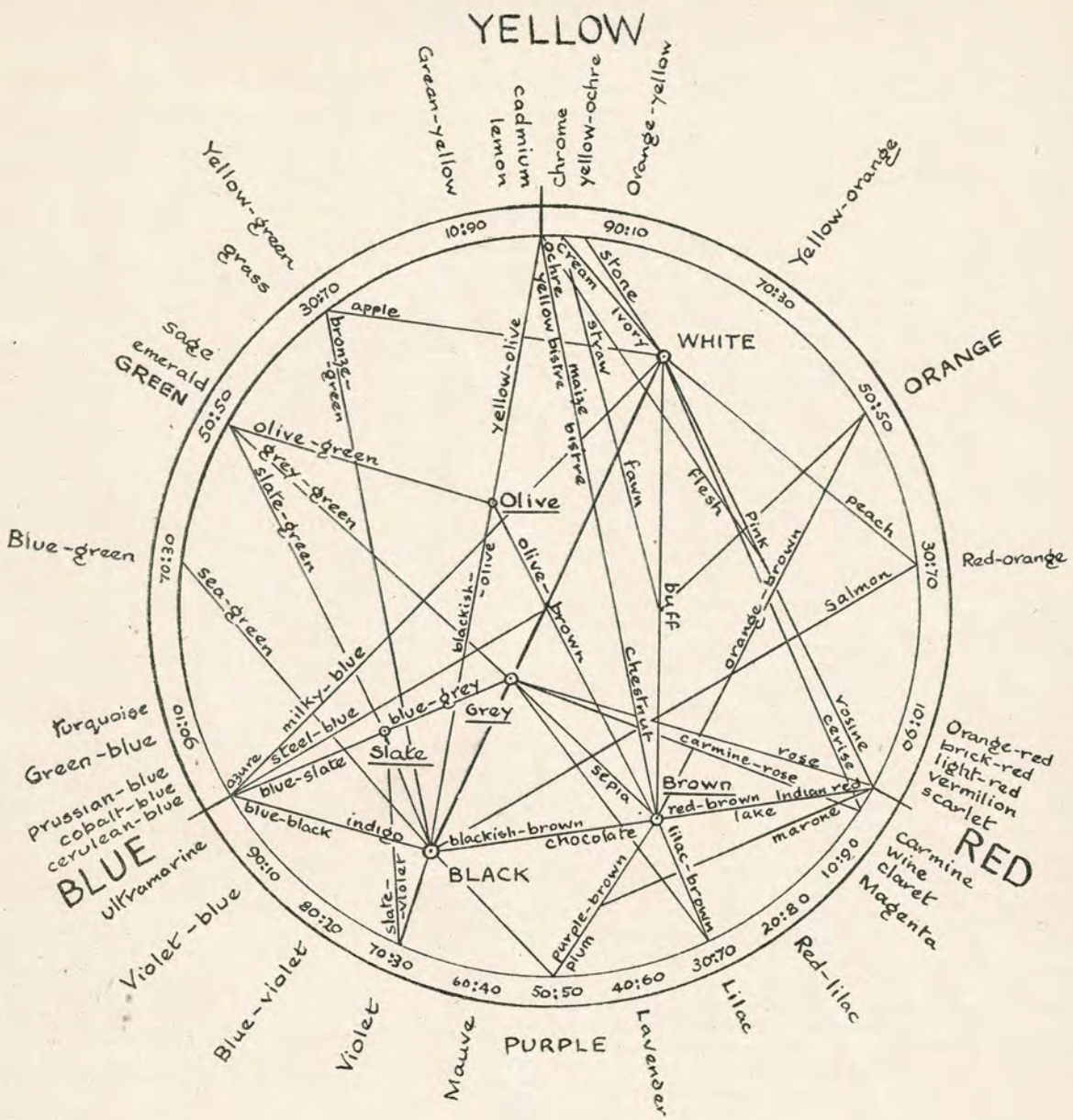
Colours in proximity as on two-colour stamps tend to change each other's hues under certain conditions, e.g. grey on a yellow background appears bluish, on a blue ground yellowish, and on a red ground greenish. If yellow and green of equal amounts and intensity are side by side the former has an orange tinge and the latter a blue. Replace the green by a blue and it appears tinged with violet. A large mass of colour tends to give lesser nearby ones a colour complementary to itself. Thus a small white object on a greenish-blue stamp would appear pinkish (red plus white), and if meant to appear white would have to be coloured with just a little of the blue-green to neutralise the pink. On the same stamp black lines would appear rusty unless the black contained some of the surrounding colour. A dark colour on a light ground appears even darker and the background lighter, e.g. dark-red seems almost black on a light-green background.

Not only is the colour of the stamp influenced by the light under which it is seen, but also by the colour of the light to which the eye has recently been exposed. When anyone has been working for a while under a yellow light and it is replaced by a white one all objects tend to appear slightly more violet than they are, violet being the complementary colour to yellow. So if after examining stamps in an illuminated shop you take them to the door to look at them in daylight, give your eyes a few minutes to get used to the change.

Colours are most intense under a moderate illumination and often lose their tone under a brilliant light; this applies especially to blues and yellows, so don't hold such stamps too close to a light if you wish to get a true idea of their "shade". All materials including paper are limited in their capacity to absorb light. Thus a blue stamp is able to absorb all the red and yellow rays of a moderate light only. Strong sunlight taxes its ability to absorb yellow beyond its capacity and the stamp appears to be somewhat green. An orange and a blue stamp that appear to have the same value under high illumination change their apparent values under low illumination so that the blue appears lighter than the orange.

One very important difference between the two most applicable home light sources—filament and fluorescent—is their effect on colour. The white fluorescent lamp emits a greater proportion of blue and green light and tends to emphasise these colours and to tone down red and orange in stamps. A filament lamp emits a greater proportion of red and yellow and so emphasises these colours in stamps and tones down greens and blues. It is generally agreed that nearly half of sunlight is blue and so a light that approximates to sunlight should have nearly this proportion of blue in it.

Two points about colour sensations—not connected with stamps—are of interest. If discs having areas of black and white only are rotated colour effects can be noticed. The sensation aroused depends on the relative positions and sizes of the black and white areas and on the speed of rotation. In the dark a red



traffic signal is recognised as red sooner than a green one is recognised as green : yet the green signal is recognised simply as a light earlier than the red can be recognised as a light.

It has been stated that the human eye can distinguish differences among two million or more colours or shades and about seven thousand have been listed. Many names have been developed by association with objects of such a colour, e.g. orange, emerald, lemon, etc. Few commonly used words are adequate completely to describe an exact colour sensation. The word red covers many thousands of colours containing red in various shades and tints ; just think of them as referring to stamps : magenta, wine, carmine, rose, rosine, rosy-carmine, pink, scarlet, vermilion, cinnabar, light-red, brick-red, lake, Indian-red, orange-vermilion, crimson, etc. Crimson itself is any of several colours ranging from true red to a bluish-red. Add to these terms of value and chroma and the number is legion. Red is not common in nature and nearly every language has a name for it and for yellow, while comparatively few have a word for green and still fewer one for blue. We have more names for sensations at the red end of the spectrum than for those of the violet end.

Many efforts have been made to standardise colour names and many charts and scales have been developed to convey the idea of hue, value and chroma. As far as we as stamp collectors are concerned, a colour chart is very useful—can we all distinguish between lavender and lilac? Some can be bought, but a knowledge of how colours are made can be both helpful and interesting.

In many cases different shades of colour arise through a stronger or weaker laying on of the colour or through an irregular supply of it. They may be produced after the stopping of a machine in such a way that an insufficient transference of colour from the cylinders makes the impression appear weak, or too copious a transference makes it appear rich. Colour tones can

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also originate in the irregular preparation of the inks and vary with the method of printing, the use of different machines, and whether it is a first or last printing. Some colours should never be mixed as they tend to destroy each other ; such are ultramarine and chrome yellow, prussian blue and cadmium yellow or vermilion, and emerald with cadmium yellow, vermilion, or ultramarine. We have all seen many colour changelings due either to chemical action or to exposure to sunlight ; colours which are particularly susceptible to fading are gamboge, chrome, lake, vermilion, emerald green in mixtures, and aniline colours.

The colour chart illustrated is designed to help classify a particular stamp as of a particular colour if the basic colour is easily determined. It is doubtful if the primary colours red, yellow, and blue exist as pure colours. Ultramarine is a blue with a tinge of red in it, prussian-blue has a greenish lustre, and cobalt-blue a slight touch of yellow. (So when in Part I we read " Barbados, 251 2½d. ultramarine, 251a 2½d. blue ", what are we to understand by the latter?) The most common reds, proceeding from the most orange to the most purple, are brick-red, light-red (light is not used here as a qualifying adjective, the colour is one sold as such and known in Germany as Englischrot), orange-vermilion, vermilion, scarlet, red (often used on its own by S.G.), carmine, wine, claret, magenta, all of which are pure colours and contain no black or white. A fine distinction is made by S.G. in using the term carmine-red. The common yellows are ochre, chrome, cadmium, gamboge and lemon (always a touch of green in the true lemon colour). Different greens can be produced by joining up the various blues and yellows, the results also being affected by the proportions used. From the secondary colours we get the indefinite and varied tertiary ones, brown, olive and slate. A colour chart should make it possible for every collector to identify the stamp colours for himself. This one shows how the different colours are prepared from the primaries and black and white according to the proportions used.

The colour names usually used by collectors are suitably marked and the philatelist gradually learns which colours form the basic ones of a stamp, and the collector of shades can learn from it the correct gradation of the different colour-shades, e.g. between yellow and brown lie ochre, yellow-bistre, maize, bistre, yellow-brown, chestnut. Between black and red we can recognise black-brown, chocolate, brown, red-brown, brown-lake, lake, Indian-red, etc. Addition of white to chrome-yellow gives first cream and then ivory ; to yellow ochre it gives stone. Peach is a tint obtained from red-orange while salmon is the corresponding shade. Some colours such as solferino, sienna, drab, myrtle-green, etc. are not easy to place on the chart which is not intended to be exhaustive, and so no attempt has been made as it would only complicate it the more. Other obvious combinations such as orange-buff, yellow-buff (Sardinia S.G.50), mauve-pink (Neapolitan Provinces S.G. 29) have been omitted in the interests of clarity. Where they fall can easily be seen. Remember the basic colour in such combinations is the one last named, i.e. in brown-olive it is olive, and in olive-brown it is brown, the first colour being added as a modifier of the other. Nor have any aniline colours been included. These dyes are coal-tar derivatives and philatelists usually consider a stamp to have been printed in such an ink if the colour is easily visible through the back and if the stamp reacts in a certain way under the quartz-lamp.

Finally I must express my thanks to Herr Albert Burneleit-Inffa (Berlin) for allowing me to make use of a short article by him, " Colour-printing and Philately ", which appeared in the German magazine *Sammler-Express* in 1947, as that gave me much pleasure and also the idea for this longer article on a similar theme.