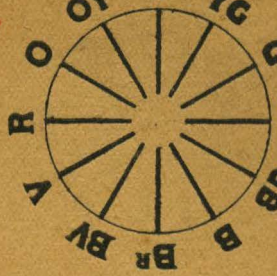
COLOR



DRAWING PAINTING

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WE live in a world of color. All nature is color : white, black, and grey do not exist except in theory ; they are never seen by the eye — they could only exist in a world that was colorless. Such a universe is beyond imagination : a world without color would be a world without light, for light and color are inseparable.

Color belongs to the painter, it is his peculiar medium. The principles and fundamental truths of color can be taught. The eye sees what the brain knows to be true. There is nothing hap-hazard about color and when its laws are understood the painter can go to his work in a direct way, without fumbling.

Remarkable results follow when children are allowed to paint without previous instruction in drawing, and the reason is easy to see : painting in color is reproducing the whole truth of what you see or feel, while drawing in line, or in black and white values, is only partial and necessitates a translation of the color to black and white. Therefore the use of color from the start enables the student to proceed along the lines of least resistance.

THE PALETTE

From long experience in teaching painting, I advise the student to procure a set of colors at the

start. He will find, if he examine the palettes that have been used by painters of the past, that the lists of colors used are invariably limited in range to suit each master's requirements. It is wise therefore and necessary to start with a list which will not be found wanting when put to any test.

Since we are to consider painting out of doors in sunlight, let us select, from the long list of colors made by the color-man, the least number that will, by mixing, produce every color and every value ; colors that are most permanent and that can be mixed one with another without causing chemical action to injure their permanency.

Starting with the yellows, we find that Lemon Yellow is almost a pure yellow ; so we take that for our first yellow. Before choosing the rest of the yellows, let us come as near as possible to a pure red, and Chinese Vermilion is selected as nearest to pure red.

Now by mixing these two colors we can produce all the variations in between — that is orange, red-orange, orange-yellow, etc. — fairly well. But fairly well is not good enough, for every mixture of pigment lowers the saturation of color, by adding the black of each pigment. So for orange let us take Orange Cadmium and also two other cadmiums — Cadmium Yellow and Cadmium Yellow Pale. It is also well to have a pigment in between vermilion and orange and Orange Vermilion fits in perfectly.

We now choose what comes nearest to pure blue, and Cobalt Blue is our purest blue. To get the colors in between red and blue — that is the violets — we

must have a red that leans towards blue rather than towards yellow. Vermilion is a little yellow or orange ; we must have a colder red and Rose Madder is the pigment to use in mixing with cobalt to make the violets. But, in order not to mix too much, let us put Cobalt Violet on the palette. By adding Rose Madder to Cobalt Violet we can make all the red violets ; and by adding Cobalt Blue to Cobalt Violet we can make all the blue violets.

While Cobalt is our purest blue we need a darker blue, so let us add Ultramarine. We now come to the greens and Viridian is the only green pigment required. We must have white and Zinc White is the best, all things considered. We shall not add black as it is easily made.

Our list arranged on the palette is as follows : Lemon Yellow, Cadmium Pale, Cadmium, Orange Cadmium, Orange Vermilion, Chinese Vermilion, Rose Madder, Cobalt Violet, Cobalt Blue, Ultramarine, Viridian, and Zinc White. Should you arrange them in the order of the spectrum, making the blue, the green, and the Rose Madder lighter, by adding white, you would see at once how much like the spectrum these colors are. The earth colors are not necessary, as our palette will make them, and, in addition, they cannot be mixed safely with the madders.

THE CANVAS

What shall we paint on ? There has been much written on this subject, but painters differ so much in their methods of painting that one kind of prepared surface will not suit all.

If, however, we do not consider the painter's preference because of his peculiar method of working, but want the most permanent canvas, I think Caseine and Zinc White is the best ground, whether applied to wood or to linen. It contains no oil to turn yellow and is absolutely white, and all colors are at their best when painted on a white ground. Also it does not crack so easily as other canvas.

Verbert's method of applying this composition is most satisfactory, and, after testing it for twenty years, I can recommend it as a very fine surface.

Since this canvas is not on the market it is necessary to prepare it : Stretch heavy linen on the stretcher. To 100 parts of caseine add 20 parts of pure water and allow it to soak one hour or more. Add 4 parts of liquid ammonia, drop by drop, stirring with a wooden spoon. The caseine is now about the consistency of syrup. Add 10 parts of glycerine, strain through cheese cloth. Grind powdered zinc-white in water with a palette knife to about the consistency of putty ; add 5 parts of this to 70 parts of the prepared caseine. This is the first coat. Rub this first coat well into the stretched linen with a large brush and allow it to dry thoroughly. For the second coat take 20 parts of white to 60 of caseine ; for the third coat, 30 parts of white to 50 of caseine ; and for the fourth coat, equal parts of zinc white and caseine.

THE KEY

You are now ready to begin to paint and your first problem is to decide upon the Key — that is,

what value are you to choose for the lightest part of your composition and what value for the darkest part ? Are you to use colors that have great saturation or are they to be greyed ?

It will be seen at once that the key must fit the kind of day that it has been decided to paint. Is it to be brilliant sunlight, with clear blue sky, clear atmosphere, and no clouds, or few : or is it to be the opposite — a very grey day ? Let us consider first the key for brilliant sunlight, clear sky, no clouds.

We see at once that a bright day differs from a grey day. The names convey the principal difference. On a brilliant sunlit day the landscape is divided into two great contrasting values — that part which is in sunlight and that part which is in shadow. The contrast is so great, one is never at a loss to say at once whether or not any object in the landscape is in light or in shadow ; the demarkation is very clear. So contrast must be kept in mind at all times while rendering the effect of sunlight in the picture.

Let us analyze this contrast in order to decide upon the key to represent it best. The lightest object in the landscape would be something white, such as a white house in direct sunlight, placed in the foreground. The darkest place would be a deep hole where the light could not penetrate, also in the foreground. Outside of reflections from the sun that are as mirrors and are equivalent, in a measure, to looking at the sun itself, these are the lightest and darkest values we have in nature and present the strongest contrasts possible.

Now if we wish to represent these extremes in

white and black without color we see at once that the best that we can do is to let white represent the white building in sunlight and black stand for the black hole ; we have nothing strong enough, either light or dark to give the full force of the contrast as it exists in nature, and whatever we do must be in the nature of a compromise. We have in our box of materials a white which is equal in value to the white of the white building, but not its value when its brilliancy is intensified by the strong light of sunlight. Black, however, is a little nearer to representing the black hole in the foreground.

Nature in sunlight is never white or black or neutral. Snow in sunlight will take on a little yellow or pink. The darkest hole is turned to color by several influences to be considered later. Therefore we have color to make up our loss of contrast in value.

The landscape on a perfect, sunny day with no clouds will be divided into two great masses — one of warm sunlight and the other of cool shadows. This, then, will determine our key — a key that will give the greatest contrast in value and at the same time the greatest contrast in color.

If, for the sake of contrast in value we make the surfaces in sunlight too pale in color, we lose contrast in color as the lights become whitish and bleached out. On the other hand if we make the color too strong in saturation in the lights we lose in contrast of value. So the key for the lights must be at that strength of value and color whereby we can preserve the greatest contrast with the shadows in both value and color.

If we choose too dark a color for the key of our cast shadows we lose color in the shadows, causing them to appear blackish, and thereby sacrificing contrast of color. If, on the other hand, we make our shadows too light in color we lose in contrast of value with the lights. So here, again, it is a matter of choosing a key for the shadows that will permit us to place both value and color at their maximum strength.

Let us consider some of the keys that destroy contrast and thereby destroy sunlight and color :

1. The lights too light, resulting in whitish and weak color.

2. The lights too dark : result loss of light, dullness, no contrast.

3. The shadows too light : result loss in strength of value, no contrast.

4. The shadows too dark : result loss of color, blackish.

5. Both the lights and the shadows too light : result weak and insipid, no contrast.

6. Lights and shadows too dark ; result loss of illumination, blackish, no contrast.

7. The lights too light and the shadows too dark : result no color, black and white.

8. The lights too dark and the shadows too light : result flatness, no contrast.

You can now put your work to the various tests and determine whether or not you have chosen a key that will give you the maximum contrast in values and the greatest saturation in color.

SHADOWS

We see our picture in one piece, but unfortunately we must paint it in piecemeal — one part at a time. Therefore it is wise to paint first those parts that will give the most complete whole, leaving the rest to be added. The advice to put something on your canvas as soon as possible without considering that something as regards its drawing (form), its value, and its color is a great mistake, because if it is false in any way that which follows is likely to be false and one lie takes many lies to cover it up. I advise the student to go slowly, to consider well every stroke, challenge every value, every color, and be sure to have everything in its proper place.

There are many reasons for doing the thing right at the first painting, and no reason for allowing oneself to say that « it is good enough, I will make it better next painting. » The start has been made with a fine, white canvas ; colors are at their best when placed on this canvas directly : the second painting is to correct the first by painting one color over another, the color underneath will injure the one on the surface in time.

I think it is true that Western artists, for the most part, unlike the Orientals, approach their subjects from the side of from, rather than color. Most of our paintings lose little when reproduced in black and white — i. e. the values without the color. So, starting with a white canvas, form, solidity, and drawing would be represented by first painting in the shadows, and therefore a picture depending on light and

shade rather than color would be nearer completeness by painting the shadows first, leaving the white canvas to represent the lights.

On the other hand, if a composition has been made in color it is well to take care of the strongest contrasts and largest areas of color first. If the composition calls for both form and color, the problem is more complex and it will be found necessary to jump from one point of view to the other and to keep both solidity and color going at the same time.

While it is impossible to paint all the shadows without painting the lights at the same time, let us, for the time being, consider the shadows by themselves and see what goes to make up their value and color. It would be better to ask what happens to different colors when placed so as to be in shadow on a perfectly sunny day with no clouds. Perhaps the most important element that enters into the composition of a shadow, to give it color and value, is the local color of the object itself.

LOCAL COLOR

Local color is the color of the object — the color that we know under all conditions, whether the object is in sunlight or shadow, indoors or out of doors. The orange is orange no matter what colors it may assume when seen in different lights and shadows. It is easier to see local color than the changes that take place because of light and shade, perspective, reflections, and juxtaposition. The child sees local color. We do not have to learn to see local color. We know local color. It is an instinct.

We have it in common with the bees, the birds, etc. It is the fixed color.

But local color is never just local color ; there is always something added. This something else gives the charm to local color. This something else is difficult to see — the savage, the child do not see it. It is a later accomplishment of mankind — and is usually developed in the individual as a result of long study.

We are likely to see what we know and until we know what happens to local color, under different conditions, we are still primitive and see as the child sees. Let us then consider what happens to the local color in shadow and first let us take up the shadow on a clear, sunny day, with a blue sky, no clouds ; at noon, or any time after the sun has risen high enough, or before it has dropped too low, causing the sun's rays to become orange or red.

THE COLOR OF THE SHADOW ITSELF

The color of the cast shadow will be seen to the best advantage without local color, that is when it falls on something white, without perspective or reflections. So let us choose a white house in shadow, without reflections, and not too near or too far from the eye, say from 50 to 100 feet. Now this shadow takes its color from the blue sky overhead : at its best it is quite as intense as the sky.

The sky overhead is slightly violet, so our shadows are blue turned towards violet. Cobalt Blue, at its proper value, which contains a little red, is about our shadow color. If the sky overhead should become the least cloudy the shadows will change to

less blue, and if the clouds nearly obscure the blue sky, the shadow is no longer blue, but grey.

We may consider the sky as a light second to the great brilliancy of the sunlight. Shadows take on the color of the light that does not cast them. A little experiment may be easily made to illustrate this fact. Choose a clear day, late in the afternoon, at about the time when an artificial light would be needed to read by. Select a position near a window in the direct light from the sky : now place an electric light, or an oil lamp, or any artificial light that is somewhat yellow, at a distance from the window in such a position that two shadows may be cast on something white by one object — say your finger. The shadow cast by the artificial light will be the color of the sky (that is blue), and the shadow cast by the sky will be the color of the artificial light (that is yellow). The same experiment may be made with moonlight and a street lamp, by moving the right distance from the lamp so that two shadows may be cast by your body on something white, such as a white building.

These experiments illustrate the same principle as that which obtains in nature on a clear day : there are two lights — the sun and the sky.

Now that we have made quite sure that cast shadows are blue, slightly violet, when cast on white on a perfect day for the test, let us see what happens when this shadow is cast on colored objects. The cast shadow in itself is not very dark in value compared with the deepest dark, or black, such as a hole in the foreground, where there is almost no light. White in shadow is nearer in value to the white paint

(to which perhaps some yellow has been added) that we use to represent white in sunlight, than it is to the black paint (to which perhaps we have added some red and yellow) that we use to represent the deepest hole.

If we divide our scale from black to white in nine parts, calling black 1 and white 9, white in shadow is at about the 5th value. We can see, then, that shadow color blue has more to say when it falls on a local color that is above the middle value, and less to say when it falls on a value below the middle and nearer black.

The shadow color blue is less affected in color also when falling on colors that are more or less grey and have little saturation of color. It is also easy to see that the blue shadow falling on yellow would lose its blueness, and falling on blue would intensify the local color blue. If the local color is light yellow, at 7 or 8, the blue of the shadow will count for more than the local color. If the blue shadow falls on a yellow of great saturation and at the value of 2 or 3, the blueness of the shadow is destroyed by the strong local color-yellow.

In representing with pigments a blue shadow falling on light yellow, or a greyed yellow, we have little difficulty because the blue shadow outweighs the local color — yellow. It is also quite easy to represent the effect when the local color yellow is strong and has great saturation, because the yellow is stronger than the blue shadow. But when the blue shadow and the local color yellow are of about the

same intensity we have the problem of mixing pigments that are opposite, or complementary.

Let us cast this blue shadow on a few local colors and see what happens :

White	makes	blue.
Light grey	»	blue, a little darker.
Dark grey	»	blue, still darker.
Black	»	blue-black.
Light yellow	»	blue, slightly greenish.
Medium yellow	»	Green, but at the same time both blue and yellow are present.
Dark yellow	»	dark yellow, slightly greenish.
Light orange	»	Blue, slightly greenish.
Medium orange	»	Green in which both blue and orange are present.
Dark orange	»	dark orange, slightly greenish.
Light vermilion	»	blue-violet.
Medium vermilion	»	red-violet.
Dark vermilion	»	dark vermilion turned a little towards violet.
Light violet	»	Blue, slightly violet.
Medium violet	»	Violet, slightly blue.
Dark violet	»	Dark violet, very slightly blued.
Light blue	»	blue.
Medium blue	»	Blue, still bluer.
Dark blue	»	Dark blue, still bluer.
Light green	»	Blue, slightly green.
Medium green	»	Blue-green.
Dark green	»	Dark green made bluer.
Light yellow-green....	»	Blue, slightly greenish.
Medium yellow-green.	»	Blue-green.
Dark yellow-green.....	»	Dark yellow-green slightly blued.

PERSPECTIVE

Now that we have seen the change in local color when a blue shadow is cast upon it, let us pass on and see what effect Perspective has on local color when this same blue shadow is cast upon it. In other words what happens to all shadows as their distance from the eye is increased ?

It can be seen at once that a great deal depends upon the quality of the atmosphere. Consider first the changes that occur when the atmosphere is very clear, with brilliant sunlight, and the sky cloudless or nearly so. The local color of the distant mountain may be green but we all see the shadow on this mountain very blue — perhaps a darker blue than the sky overhead. All the local colors — greens, yellows, etc., have been swallowed up in the miles of blue atmosphere.

If we examine the shadows, say in the middle distance, we see that the atmosphere is still having quite an influence in bringing all the shadows, no matter what their local color may be, very near together in their blueness.

Vermilion is the local color that would be the first, in shadow, to assert itself when plunged in the blue atmosphere : after vermilion, orange and then yellow are the most visible. The moment we leave the foreground this blue atmosphere begins to devour what local color was left after the blue shadow had been cast upon it : greens and violets disappear first, and as we go farther into the distance, yellow-greens, yellow, and orange, and, finally, vermilion. I have considered all these local colors at their greatest intensity — that is when they are not greyed by white or black.

HOLES

After Local Color, the color of the shadow, and Perspective, we might consider Holes in the cast shadow. For example, the deep holes in the foliage

or the blackness of an interior of a house, as seen through an open door or window. The holes are the darkest areas in nature, when in the foreground ; they differ from the cast shadow in color because the blue light from the sky cannot reach them — therefore they are not blue. They are a bit of indoors out of doors and, like the shadows indoors, are warm in color.

When the hole is very dark the local color counts for little in determining its color. Another element enters in to qualify its color as we shall see later.

Perspective robs the holes of their intense blackness and therefore the holes grow lighter in value as they gain distance from the eye. We must never repeat the value of the black hole beyond the foreground.

REFLECTIONS

We now come to the fifth element that enters into and qualifies the color and value of cast shadows — Reflections.

Shadows would be very easy to represent if it were not for reflections ; but reflections give great charm to the shadows, great variety in value and color. If it were not for reflected light the shadows would always be separated from the light in value and color by a great gulf : but reflected light is at times so strong that it causes the shadows to become only a little less brilliant in value and color than the direct light.

The reflected light comes from the surfaces bathed in warm sunlight and falls on those surfaces in

shadow that are turned towards them. A good example may be seen in a person of light complexion, dressed in white, seated in the sun, on a beach where the sand is yellow. It will be noticed at once that the white dress in shadow is divided into two great contrasting colors — blue and yellow. At some places it may pass from blue to yellow in a very subtle way.

All surfaces that are turned towards the sky are qualified by the sky-color, blue : all surfaces that are turned towards the yellow sand are more or less yellow. Those surfaces in between take on both blue and yellow. Observe the head of the model in shadow, perhaps from a hat : you will see such surfaces as the upper part of the nose, over the eyes, the cheek bones, in fact all the flesh surfaces that are turned towards the sky are cool violet, bluish, qualified slightly by the warm local color of the flesh. Now notice under the nose, under the eyebrows, under the cheek bones, the upper lip, just under the lower lip, etc., all the flesh surfaces turned towards the yellow sand, and it will be seen that they are qualified by yellow. The lower lip, turned towards the blue sky becomes red-blue, that is violet ; the upper lip, turned towards the sand becomes red-yellow, that is orange.

Those curved surfaces that are turned so as to receive the maximum strength of reflected light from the sand are almost as yellow and as light in value as the sand in sunlight. As the surface turns away from the sand towards the sky the color passes from this yellow to greenish-yellow, then perhaps to

orange, slightly qualified with blue ; from orange to more rose and from rose to violet.

Reflected light is likely to play a part in most of the shadows that are in the foreground. As we leave the foreground reflected light, like the holes, is lost in the shadows and can not be separated from the shadow. While at times the reflected light is practically the same value as the shadow, in most cases it is lighter.

JUXTAPOSITION

Observe now what effect the colors that surround the shadows produce upon the shadows — that is Juxtaposition, and the fifth element that goes to qualify and change local color in the shadows.

We have seen, first by the color of the sky and then by perspective, how blue enters into the composition of the shadows, while holes in the shadows and reflected light somewhat counteract the blues by adding warm colors, such as yellow, orange, or red.

Now since the light is somewhat yellow and the shadows blue, we have two opposing colors that are opposite each other in our scale, and are therefore complementary. Hence the shadows become more blue and more intense by juxtaposition.

The shadows cast on green grass, which is open to the blue sky may be blue-green, but with the contrast of the yellow-green of the grass in sunlight become even more blue-green, and at times very near pure blue.

Take another example : A vermilion roof, partly

in sunlight and the rest in shadow. We notice that where the vermilion is in sunlight it is turned to orange and where it is in shadow it is violet.

We have seen why the shadows are turned towards blue — like the sky : we see what causes the vermilion to turn towards yellow in the light, in dealing with the lights : we also know that when two colors are juxtaposed they repel each other. (When truly complementary they both become more brilliant.) So the vermilion in shadow has been forced to violet by contrast with the yellow in the light. Every shadow is forced away from the color of the sunlight surrounding it.

This does not mean that shadows falling on colored objects are always complementary to the color of the light. A simple example will show that they are not. Orange in sunlight turns towards yellow : the complementary color to yellow is blue, slightly violet, while orange in shadow is greenish orange, and far from blue. However, under the most favorable conditions, shadows cast upon yellow can be quite blue.

Greys placed beside brilliant colors are turned to the complementary of the brilliant color. We have said that holes in the shadows are blackish and therefore not colorful in themselves ; but when the hole is surrounded by a color of great saturation, it takes on the complementary color. Red and red-violet are complementary to green, therefore the deep holes in the shadows of the foliage are turned towards violet or red.

Wherever you have in the shadows a color of

great strength and purity and within this area find spots that are grey, or complementary, or different from the color of the shadow, these grey spots surrounded by a color that has great saturation will take on the complementary color. Example : An old shingled roof in shadow may be quite violet : but if there are some shingles that are grey in themselves the violet surrounding them forces them to become greenish. Here then is danger of seeing too much green in an area of violet. In the case of the holes, you want the contrast because of the different surfaces to be expressed, while the roof is one surface and the greens must not be allowed to overlap other greens in the picture and thereby destroy the large surface of the roof.

The effect of juxtaposition is weakened as we leave the foreground and middle ground and approach the distance, although some of the blueness of the mountains, in the distance, in shadow, may come from the contrast with the yellow in the sky, low down and perhaps near the sun.

We have made all these investigations when the sun is yellow or whitish. As the sun goes down it turns from yellow to orange, then to vermilion and deep rose. This change has a great effect on the color of the shadows and instead of the sky playing the greatest part in qualifying the shadows, making them blue or violet, juxtaposition exerts the stronger influence and the shadows take on the complementary color of the light from the sun, and as the color changes from yellow to orange in the lights, the shadows move towards green until the last red rays

of the sun swing the shadows to strong green. This, of course, is the shadow color when falling on white : when falling on colored objects it is qualified by the green shadow rather than violet-blue (as when the sun is higher and the light yellowish-white). The same is also true in early morning, when the sun is red.

To sum up, we see first the shadows receive their value and color by :

1. Local Color.
2. The color of the shadow itself.
3. Perspective.
4. Holes.
5. Reflections.
6. Juxtaposition.

LIGHTS

Let us now consider the surfaces that are bathed in sunlight on a perfect day for painting the effects of sunlight — when the atmosphere is clear, the sky blue without clouds.

If we know the different causes that go to make up values and colors in light we shall find less difficulty in seeing the changes through which nature goes thereby. I think the different elements that enter into and decide the value and color of the lights are :

1. Local Color.
2. Effect caused by mixing colored light and local color, and change caused by great illumination.
3. Perspective.
4. Sky Reflections.
5. Juxtaposition.

LOCAL COLOR

In dealing with the light out of doors we name local color first just as we considered local color first in treating the shadows. We saw how local color lost its value and color when in shadow ; now note what happens to it when it is flooded with sunlight.

Sunlight, having such power of illumination, has a great effect upon the value of objects upon which it falls. Black in direct sunlight is very near the value of white in shadow. White in shadow is about half way between black and white, or a little nearer white : therefore black in sunlight is at about the same place and all other values in sunlight fall between this value of black in light and white paint — our highest value for representing white in sunlight.

Thus, if 9 represents white in sunlight, about 5 will stand for white in shadow and black in sunlight, while 1 will represent the black hole in shadow, and all shadow values will fall between 1 and about 5.

Since we are compelled to accept white pigment with a little yellow to represent white in sunlight, our palette has nothing to represent the light that is added to white by brilliant sunlight. In other words our scale is very much shorter ; we have not so many intervals between white in sunlight and black in sunlight, therefore there must be some loss in contrast of value say between white in light and any light color in light. Example : A white dress in sunlight against green grass in sunlight we are obliged, by our limited range, to render as practically the same value. However, the white of the dress, on the

canvas will jump away from the yellow-green of the grass and give a contrast and separation that are not represented by value.

With only five values on the palette between white in light and black in light we must be very careful to place every color in its proper place. One can easily see how one could exhaust one's values in the light and then begin to encroach on the values of the shadows.

This error is one of the most common to students and professional painters alike and is brought about many times by working in the lights, trying to get the many steps seen in nature, forgetting what is to happen with the shadows when some of their value has been stolen and used in the lights.

Since sunlight is yellow-white, our problem is to see what happens when this yellow-white light falls on objects that have color. Sunlight, being so brilliant, when falling on objects that are light in color weakens the value but makes them more brilliant ; but colors that are dark in value and strong in color, may, when in sunlight, have more saturation of color. Example : A person of light complexion will lose color saturation in the light, but will gain in the shadow ; while a colored person gains color in the light but loses in the shadow. A very dark blue becomes brilliant blue in the light, a gain, while in the shadow it becomes a still darker blue, a loss of color.

In nature there is little loss of color saturation when sunlight falls on light colors ; but since in reproducing the value in pigments we find it neces-

sary to add white to our light colors — that are already at their greatest intensity — we find that we have weakened their intensity. It is wise therefore to compromise and lose comparitive values in order to gain color.

This loss and gain is due principally to change in value, but since the light is yellow and yellow is complementary to blue, all blues in sunlight are whitened as well as lightened, while yellows and reds will be intensified by the yellow light. Example : Take a light violet, or a medium light violet, in sunlight ; the yellow light eats up the blue and leaves the red (rose madder). Another example : Green grass in sunlight, the blue is almost destroyed leaving the yellow ; and when the foliage is a light green it will appear yellow in the lights.

We find by observation and experiment that :

Yellow light	falling	on	vermilion.....	gives	orange-red.
»	»	»	orange.....	»	orange-yellow.
»	»	»	yellow.....	»	more brilliant yellow.
»	»	»	yellow-green..	»	yellow.
»	»	»	green.....	»	yellow-green.
»	»	»	blue.....	»	whitish blue.
»	»	»	violet.....	»	reddish violet.
»	»	»	purple.....	»	orange red.

The above colors are taken at their greatest saturation and the change is caused by the increase of illumination and also by the mixing of yellow light with the colors.

PERSPECTIVE

Now what is the effect of perspective or distance, on the lights ? Bear in mind that we are still considering a perfectly clear, bright, sunny day, with blue

sky, etc. On such a day there is the least atmosphere. We have observed that the shadows grow weaker in value and bluer or greyer as they retreat into the distance. This is not true to the same extent with the lights, especially the brilliant colors in light, and least of all is it true with regard to white.

You will notice that a white sail in light, a mile or two away is almost as white as white objects in the foreground : the sail may be a little yellower. Next to white, brilliant yellow holds its own very well as it goes into the distance when in light. Then orange, which turns to rose-orange as it recedes, then vermilion. Colors that are more or less grey, reflecting less light in sunlight, are lost in the distance, taking on the color and value of the shadow.

SKY REFLECTIONS

We now come to sky reflections in the lights. Water is, perhaps, the best reflector of the sky, also polished or shiny surfaces take on the color of the sky. The value of water when reflecting the blue sky is lighter than we can paint it and still have it a saturated blue (unless one is looking almost straight down upon it, in which case it has a strong color value). Example : The value of the shadows upon a person dressed in white against blue water will be a trifle darker than the blue water. Therefore it is wise to compromise and to key the water from the white in shadow. In other words we are likely to forget that the water is in light and to carry it too near the value of the shadows in our picture instead of keeping it in the values of the lights.

A good example of the shiny surfaces as reflectors of the sky is found in the glossy foliage of trees and bushes and on the grass of those parts that are in light. Since leaves that are shiny and turned towards the sky reflect a great deal of white light they appear lighter than the rest of the green foliage in light which is yellow, or yellow-green. When the cool white or blue reflection is omitted in the warm lights they lack quality and become crude. Qualifying the lights by this reflection helps to give variety of color and charm to a picture. However one must not cary this reflection too far and thereby destroy the warmth and color of the light.

Sky reflections qualify the lights in the same way that reflections from the lights qualify the shadows. It will be seen how necessary it is to have the great mass of light and the great mass of shadow far apart in value and color, because this qualifying brings them nearer together. Sky reflections are lost in the lights as they recede into the distance.

JUXTAPOSITION

One more element enters into the composition of the lights to account for their color, or, shall we say, to affect local color-juxtaposition.

In a broad way it might be said that all the lights are made a little warmer, or yellower, by contrast with the shadows. A good example is to be seen in sun spots falling on a white building ; these spots caused by the lights filtering through holes in the foliage of a tree overhead. The sun spots are, therefore, surrounded by a shadow that is open to the

blue sky and therefore very blue, or slightly blue-violet. The spots are, perhaps, a little yellowed by the yellow light, but they take on most of their yellow from being placed beside the blue shadow. It will also be noticed that the sunlight spot is yellowest where it touches the shadow and least yellow in the centre of the light spot.

If the building is yellow in local color these sun-spots will appear orange, especially at the edges next to the shadow. When falling on green grass the yellow in the lights is partly due to the contrast with the blue-green shadow. Let the sun-spots fall on a grey-violet roof, like old shingles ; here, too, the yellow that may qualify the rose in the light is brought about by contrast with the blue-violet shadow. On blue the sunlight is more yellow than it would otherwise be except for juxtaposition. On spectral red the lights are forced towards yellow, stopping at orange. Orange will be forced to yellow, by contrast to the blue that enters into the shadows from the sky.

GREY DAYS

There are many varieties of grey days, ranging from those caused by heavy, moist clouds, through which the position of the sun can scarcely be located, to very light grey days, when the sun seems likely to break through at any moment.

We have observed the great extremes in value and color, in nature, on a brilliant, sunny day. Not so with a grey day. While the range from the darkest hole to the lightest part of the sky (or reflection of

the sky, upon water or whatever) is as great or greater than that of our color scale — from black to white — it is very far from nature's range in sunlight. So grey days come nearer in value to studio light and more nearly within the scope of our pigments.

Another point, sunlight is a great searchlight and cuts sharp but when it is filtering through clouds all this quality is lost, its rays are shattered and it becomes a soft, diffused light, coming not from one point but from the whole sky : so there is no sharp division between light and shadow.

On a very light grey day, when the sun is almost peeping through the thin clouds, the lights of your landscape will be closer to the lights of a sunny day.

The difference in color between a grey day and a sunny day is even more marked than the difference in value. Without the blue of the sky to give color to the shadows they become non-committal, slightly warm, like the holes on a sunny day. In fact all shadows on a grey day may be considered as holes. The lights on a grey day, those surfaces that are turned towards the sky, are slightly cool. It will be seen, then, that local color on a grey day stands for itself ; it is little affected by light or shadow, but is greyed by the atmosphere. Contrasts on a grey day are, therefore, principally contrasts of local color.

Because the light is so weak on a grey day the landscape stands out darker in value than the sky or reflections from the sky. The sky is lighter, almost invariably, than a white house.

On a grey day complementary colors when placed side by side have less effect on each other,

because of their greyness, than when so placed on a sunny day.

The effect of perspective on the value and color of local color that obtains on a sunny day holds good on a grey day. On some grey days distances appear nearer than when the sunlight is shining upon them, causing vibration, and the fact that the landscape is darker than the sky also brings the distance a little nearer in appearance.

Shiny surfaces that are turned towards the sky become whitish, or cool in color, but not to the same extent as on a bright sunny day.

The effect on color caused by less illumination may be observed in a flower garden. If you will compare the yellow, orange, and red flowers with the blue flowers on a grey day you will see that the warm flowers are much darker in value and the cool flowers much lighter than they were on a brilliant day.

MIXING OF PIGMENTS

If we add white to any of the yellows and reds, except Rose Madder, we grey them and cause them to lose saturation. The blues, violets, greens, and Rose Madder are increased in saturation by adding a certain amount of white, but after having reached the point of greatest saturation additional white would grey the color and give tints.

Black or grey added to colors that are at their greatest intensity greys those colors. Colors lose saturation and are greyed when all three primary colors — red, yellow, and blue, are used in the mixture.

For example : Adding blue to orange is the same as adding black or grey to it. Adding yellow to violet adds black or grey to violet. Red added to green adds black or grey to green. It is, then, the third color which produces mud.

When you wish to grey or qualify a color the third color is most valuable. It takes the place of black in mixing, but its use is most disastrous if it is desired to keep the purity of the hue.

Black is made with Ultramarine, Rose Madder, and a touch of orange. A beautiful grey is produced by using Emeraude Green, Rose Madder, and white.

We have shown that the mixture will be pure if the third color is left out. Not to be limited let us try mixing the third color and see its value in producing tone.

There are greens in nature ranging from cold blue blue-green to a green so warm that it takes quite a little orange to make it. Of course this is a warm, grey green. If it is found to be still too green it can be greyed as much as desired by adding red (Rose Madder). But before adding the red to the green, or even to the orange, make quite sure that the red that appears to be mixed with the green is mixed in nature and not another area, in itself red or violet. These areas of red or violet run all through the greens and are quite pure in color ; they freshen the greens, causing a very muddy green to become purer and more lively.

If nature greys her greens by some quality of red or violet that has its own area, be sure to take advantage of this fact when representing it by taking the

cue from nature and keep the areas of red separated from the greens, on the canvas.

We have orange from a very warm red red-orange to a very cool orange that contains quite a little blue ; but, again, the color is very much greyed by the blue. Let us go to nature for another example : This time take an orange colored house in part shadow when the sky is blue. Here we have a blue shadow falling on its complementary color, orange, when the local color is of about the same saturation as the shadow, and we mix orange and blue, at about the same intensity, to represent it. The result is far from the purity of color which nature achieves by mixing these opposed colors. In nature we are conscious of both orange and blue, very well, then, break this shadow on the orange house with both blue and orange, but be sure to keep the blue and orange at the same value.

The same method can be used when greying or neutralizing violet. Violet can be very cool — blue blue-violet — or very warm, when mixed with yellow or orange — but of course very much greyed. Here again when the violet and yellow are of about the same intensity and the mixing of the pigments gives us no color, it may be wise to break the area with both violet and yellow, or to have the area more or less flowing in color — that is in some places suggesting the violet and in others the yellow.

In mixing colors it is wise to go slowly. Suppose you are painting a blue sky and you mix Cobalt Blue and white to get its proper value. It may look raw, too blue, and you then discover there is a little yellow running through it. You add the yellow and

still it is not quite right — it lacks red, but since red was the last color to be discovered in the sky, it is therefore the weakest. Go slowly in adding the red. Red would qualify and give tone — but it also greys.

Every color leans towards yellow, red, blue, orange, violet, or green — that is it is made up with one of these predominating. When one of these six colors does not predominate the area is non-committal in color, it is just white, black, or grey.

Let us then mix our pigment in an orderly way and be sure not to mix too much of any one color. If the color is just yellow, red, or blue we are only concerned with its value. If it is orange we must be sure it is the right hue, that is that it contains the right quantity of red and the right quantity of yellow at their proper value. If it is violet, how much blue and how much red (Rose Madder), and its value ; if it is green, how much blue and how much yellow, and its proper value.

If the orange is not just orange keep adding blue at its proper value till the hue is reached. If the violet is not just violet, add yellow of the same value until you get it; if the green is not just green, add red until you arrive at it. In this way the proper color and true value are worked up to without guessing and without making the mistake of allowing the qualifying, or greying color in the mixture to overbalance, making it necessary to begin all over again.

COMPROMISES

At times it is wise to lose the true value of a color in order to gain in strength of color.

Vermilion in sunlight is a good example : Vermilion, as a value, is about half way between white and black, or a little nearer black ; but when placed in sunlight its value becomes only a little less light than that of white in sunlight. It has also become orange, which helps, somewhat, to keep its strength of color.

However, should we add the necessary amount of white to the vermilion, or orange vermilion, to give it its correct value, the result would be a very weak color and would not represent vermilion. Therefore since vermilion is such a warm color there is less danger of destroying our light by sacrificing its value rather than its color, and it is safe to paint it a little darker, or stronger, than it truly appears in sunlight. We thus lose a little both in value and color.

Another example : We cannot get both the blueness and the value of a real blue sky without using a value that would make all our shadows, relatively, too black. Therefore it is best to compromise and to make the sky a little less blue so as to keep the proper contrast in value with the shadows.

Since we want all the saturation of color we can get in the lights of sunlight and at the same time all the contrast of value between lights and shadows, it is safe to compromise by losing value for color in the case of warm colors in light and color for value in cool colors in light.

If the true value of white in shadow in relation to the lights forces the use of a color that does not represent white in shadow, it is better, perhaps, to lose

some contrast in value and thereby get nearer the color of the white in shadow.

To attain the just contrast in value or color of the lights and shadows it is necessary to lose either value or color and it is here that a wise compromise will give the maximum strength and contrast.

COMPLEMENTARY COLORS

In rendering sunlight effects it is most important to make use of complementary colors. Complementary colors, when placed side by side, cause one another to become more brilliant and increase their apparent saturation. The eye likes to see colors so placed.

Nature uses her colors so opposed : the warm, yellow sunlight with the cool, blue shadows ; the red flowers with the green foliage ; the green and yellow foliage with the violet branches. So it is well to know the complementary of any given color.

Your watch dial will serve you to keep in mind at all times the colors that are most opposed. Let us place yellow at 12 and its complementary, which is blue, with a very little red in its mixture, at 6. At 9 let us place red and at 3 blue-green. At 5 we place blue and its complementary orange yellow at 11, etc.

With brilliant colors it is easy to see the complementary color. Take a bright yellow flower, such as golden-rod, and move it slowly over a neutral background — the flower will be surrounded by its complementary color, blue slightly red like a halo, for a distance of one-half an inch to an inch or more. A violet flower will give a yellow-green halo, etc. If

it is desired to approach nature this fact must be considered when painting brilliantly colored objects.

If two colors are placed side by side, both of about the same area but slightly removed from a straight line across our dial — for example a yellow-green at about 1 and pure blue at 5 these colors repel each other — that is the yellow green is forced towards yellow and the blue takes on a little red having been forced towards violet. Orange placed beside red forces the red towards violet, while orange is carried towards yellow, etc.

If the colors are of unequal area the smaller area is most affected. If one has greater saturation of color more change takes place in the weaker.

Much has been written about complementary colors but these simple facts will give the cue to their proper use in painting.

OVERLAPPING

We say that a picture has good values when all the objects in it are represented at their proper solidity, when they are in true relation to each other, when they take their correct place as to perspective, when the parts that are in light are in just relation to the parts that are in shadow, and the surfaces in shadow are in just relation to the surfaces in light.

Painters who start with the sky and paint to the foreground are in danger of overlapping in value. This comes, first, perhaps, from trying to paint the sky as blue as it is and, second, from trying to make all the steps in value that the eye can detect, with the result that dark values in each plane overlap and trespass on the oark values of the plane which is nearer

to the foreground. Therefore it is a good plan, at times, to start with the foreground and work to the distance.

There is also danger of overlapping in value on the same plane. For example : If we should make white in shadow too dark this tone would overlap darker surfaces in shadow ; and if we should make flesh notes in light too dark in value they would overlap and rob the shadow of its value. Overlapping and making values that are different alike are the causes of bad values.

Overlapping in color is the cause of dirty color, loss of character in color, loss of separation, loss of texture, loss of variety, loss of contrast, and loss of that peculiar color each object has that keeps it apart from its neighbors.

For example : We have in almost every landscape a great variety of greens ranging from a very blue blue-green to yellow yellow-green. Our problem, then, is to know how much yellow to mix with the blue and also which yellow ; if we need white, how much, and, if we wish less saturation, how much red or grey must we add in order to have each green stand for itself without encroaching upon its neighbor.

One of the most common errors of overlapping in color results from using too much yellow in the composition of the shadows on a sunny day, or too much blue in the lights. In other words, by allowing the lights to become too cool in color they take color from the shadows and by making the shadows too warm they rob the warm color from the lights.

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