In this two part mini-series aspects of colour that are essential to the artist or designer are examined. These include the language of colour, what colour is, how to mix colours and build a foundation on which to base an understanding of colour and how to use it effectively.

Part 1
Understanding Colour

by Merv Moriarty

To allow us to talk meaningfully about successful (or not so successful) use of colour in a painting or design, we need to extend our vocabulary. This language has to identify aspects of colour and what happens when various colours are placed together. Whilst being able to appreciate at a subconscious level, the beauty of the colour present in the picture, without a suitable language, a viewer might have no means of learning anything from the experience.

Colour, or rather a lack of understanding of it and how to use it, is the thing that lets most artists down. We see this clearly when we look at work sent in for competitions. Form and structure are of course very important in any painting or work up in front of them, virtually everyone in the group will agree that the colours seem right with that person, but when they are exchanged with other people in the group, only a few strike a match. But how many of us would feel satisfied if we thought that the image or design we were creating could not reach out beyond ourselves and connect with others at some more universal level.

Here is an exercise to focus our attention on issues pertinent to colour relationships:

1. Mix six or seven different colours that you like with complete freedom of choice and sufficient of each to carry out this exercise. By six different colours I do not necessarily mean six different hues. Any type or degree of difference is acceptable.

2. With a pencil, charcoal or thin paint make a loose grid format on a sheet of paper of any shape or proportion. Looser is better, with some randomness in spacing, which will provide more interest. The grid design helps to hold a colour pattern together and when everyone in the group uses it, this makes comparisons easier.

When inexperienced colourists do this exercise the results rarely have any universal appeal. With experienced people, not surprisingly, the results vary. Importantly, because the grid format offers little picture making potential and depends so heavily on the quality of the colour relationships, it is perfect for a colour exercise. It is the way those six or seven colours co-operate that matters. So, as you would expect, those in the group working on this exercise who have chosen their colours well, will get the best results. This of course leaves us with the obvious question; what is it that would make a particular choice of six colours work well together? Perhaps the quick answer to that is to say colours that co-operate toward a single unified design, but this needs further consideration.

What is it that is right about particular combinations of colours, when other combinations work less well? For instance, what do we change with an unco-operative colour to make it more co-operative? To answer that question we need to know how to talk about colours and relationships of colours.

Combining colours is not like mixing ingredients for a cake - essential before any worthwhile discussion of colour can take place is that all those involved need to have a common language. I usually start a colour workshop by engaging all the participants in a discussion amongst themselves on how we might define a specific colour. In almost all instances this results in attempts like “It’s a red-ish, muddy colour with a purpl-ish tint...”. Often people try to describe the colour by saying what is in it, as though it was a recipe for a cake. If a mixed colour is not, as with the cake, the sum of its ingredients, then what is a specific colour and what happens when we add another colour to the mix?

For this description of a colour to be truly valuable, it should evoke a language that remains constant whether we are talking about how to mix the colour or consider it in relation to another colour; and such a language exists. I will come to the first few essential words in this language shortly, but first let me go back to the absolute beginning of what colour is.

What is Colour?

Before colour can exist, three things have to be present. The first thing is light; the second thing is a surface or surfaces that interact with the light in a way that can create colour; the third and absolutely essential thing is an eye and an intelligence behind it that can turn the wavelengths or vibrations that are light, into the experience of colour. A butterfly or a bird can perform this miraculous task, but we humans can not only experience colour, we can ponder it and consider relationships of colour from many different points of view.

We can use our discernment and be enthralled or uplifted by a magnificent display of colours in nature or in the arts of man.

Colour is light and any perceivable colour is a point in the totality of light. What we see when we look at a painted surface is not the pigment paint, it is the light reflected back off the painted surface. The pigment in the paint (or any coloured surface) is selectively absorbing part of the total “white” light and reflecting back the remainder of the light. The colour we see is that remaining, the original white light. Mixing one colour with another to get yet another colour can bring this concept right into focus.

When we add a second colour to a colour we have started with, the second colour does not add complexity to the first colour. It simply shifts the first colour from its point in the total of all colour (white light) to another position. This is the most critical thing to grasp if we are going to work effectively with colour. When we add one colour to another colour, the second colour pulls the first colour toward itself, either across, around or through the space that is light experienced as colour.

To grasp the principle that a particular colour is a point in the space of another dimension (the dimension of light), we need to start with the spectrum, which we usually see as a rainbow. A spectrum is all the colour generating wavelengths from shortest to longest in a continual progression. Our eye, and the mind behind it, sees this progression as a continuous change of a particular aspect of colour, namely, hue. The whole range of hues from shortest - blue, to longest - red, have common names. From the spectrum we can build a structure that encompasses all colour visible to the human eye and puts it into a meaningful form. This then allows us to have a clear concept of the relationship between one colour and another. From there we can mix colours and adjust relationships between colours with a real understanding of what we are doing.

It is to Newton that we owe our gratitude for the first colour wheel as a system of relating colours, but the colour wheel has developed through time into something dramatically different from its original seven-colour form. HUE is the name we give to a colour’s place on the spectrum.

When correctly aligned, all hues around the wheel lie opposite their complementary colour. Complementary means remainder of the whole (not that the hues look good together and when they are at full strength - they don’t). When two complementary colours are combined as light, such as on a computer or television screen, they make white (the total of all colour as light). When the same hues are combined as pigment they make black (the absence of all colour). This then is the second word describing a variable of colour: TONE – the lightness or darkness of a colour. The word brightness is more commonly used today instead of tone, but they mean the same thing. We now have two words that describe a variable of colour.

The third of these is PURITY, frequently called saturation. Although the term saturation is valid and commonly used today, I prefer the term purity because saturation can be confused with another term – chroma. Chroma is not a basic variable because it refers to the level of intensity of the hue in any colour and is dependent on the colour being at the tone at which hue reaches its greatest intensity. Chroma is a difficult term to understand.
THE THREE VARIABLES OF COLOUR

1. **HUE** the identity or wavelength of a colour. Hue can be defined independently of the other two variables. In the general community, hue is frequently misnamed, sometimes even being referred to as tone.

2. **TONE** the lightness or darkness of a colour. Tone can be defined independently of any other colour quality. Tone is sometimes called value, tone-value, brightness, lightness, or intensity. These alternative terms should be considered as valid as they are often quite established in the culture; other references to this variable are (somewhat vaguely) referred to as shade or tint.

3. **PURITY** the degree of greyness or lack of greyness in a colour, often called saturation, which is a term that has become validated by use; it is also (I believe incorrectly) often called chroma. This is a complex variable, which can be defined independently of the other two.

Black, white and grey are exceptions as they are neutral (have no hue or purity), therefore they are definable only by tone. Such things as surface shine or purity, therefore they are definable only by tone. Such things as surface shine or purity, are not variables of colour. A specific colour, such as a patch of the sea, could be identified and matched entirely by correctly identifying its TONE, its HUE and its PURITY.

So the colour of an area of water over pale yellow sand and reflecting a TONE, HUE matched entirely by correctly identifying its TONE, HUE and its PURITY. They are shown here at ten-degree intervals of a compass. Any point on the circumference of the wheel is a specific hue.

What happens then when we mix a colour of a particular hue with a hue from another point on the colour wheel? We will get another colour of course, but exactly what that colour will be is the critical issue. It is utterly determinable and predictable. Many years of teaching painting and particularly colour to a huge number of people has shown me that most artists, sometimes even quite experienced artists, cannot clearly predict the outcome of a particular combination of colours. The simple truth is that the result of mixing any two colours together is dependent on where those two colours are on the colour wheel. If we mix the two colours together a little at a time we will create a pathway between the two colours across, through, or around the colour wheel. The path is determined by where the colours are on the colour wheel.

The Moriarty Colour Mixing System is a further development enabling the artist or designer to plot their chosen colour. Turn the plotter around to find the path between any two colours or find a range of combinations that will give you any colour you want. The Three-Section Colour Wheel enables artists to mix colours in pigment (colour subtraction) whilst maintaining mental contact with the principles of colour addition. Remember, the secondary colours of pigment are the primary colours of light and vice versa. With the exception of Yellow, most pigments are within one section or another. In practice this means that you will need more than three primary colours of Magenta, Yellow and Cyan on your palette. One red — say Cadmium Red — an extra yellow — say a deep yellow, a blue such as Ultramarine or French Ultramarine, a Viridian which is close to Cyan. With VUridian it is most important to use only the genuine pigment. An excellent Magenta is Rose, though colours will vary from brand to brand.

Mixing colours from different sections of the Three-Section Colour Wheel has quite a different effect on the purity of the resultant colour compared with colours from the same section. To change hue with the least possible alteration to the purity of the resultant colour, use a combination of colours that lie within one of the three sections of the wheel; that is, the red, blue or green section. This system is a physical and mechanical presentation of the whole of light as colour.

All the hues are there at 10 degree intervals and each step away from the purity on the outer edge toward the grey in the middle represents the relative proportion of the presence of the opposite (complementary) colour. The interval between colours can now be seen in terms of their position on the colour wheel.

The plotter, which is the clear sheet that sits on top of the colour wheel and is attached at the centre has a diagram printed on it that can be swung around to show a number of possible combinations that will make any colour chosen on the colour wheel by mixing the two colours at the ends of a chosen path.

THE MORIARTY THREE-SECTION COLOUR WHEEL

This includes a number of significant principles. This wheel lets us look at all possible hues, which includes the entire spectrum and the connecting colours when the spectrum is bent into a circle and joined at Magenta. They are shown here at ten-degree intervals of a compass. Any point on the circumference of the wheel is a specific hue.

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All the paths between colours are represented by the plotter and you can turn it around to find the path between any two colours or find a range of combinations that will give you any colour you want.

1. If the colour you want is a pure colour (or close to it) you can use the (a-b) path. The (a-b) path works only within any one section (red, green or blue) of the three-section colour wheel. It is used mostly for pure or nearly pure colours.

2. If the colour you want is impure (less saturated) you will be able to get your colour with a range of possible combinations of colours. Use the range of paths C to J that connect at K.

3. Simply find the colour you want on the colour wheel; turn the plotter around to find alternative paths that cover that colour. The colours at the end of any path you choose will give you the colour you want when mixed. One end of any path is always (a) unless using the (a b) path.

**about the artist**

Mers Moriarty’s influence on art in Australia has been profound. His vision in starting EASTAUS, the flying art school in 1971 is legendary and his influence on many artists continues to this day. Moriarty, also a professional artist, has for over forty years combined philosophical with technical discipline and research to be one of the most highly respected art educators in the country. His book, COLOUR - the definitive guide, contains Moriarty’s new theory on colour combinations.
Getting started

We select the colour we want to match; here we select a gum leaf. We identify its position on the Three-Section Colour Wheel - the colour you want to match may be a lighter or darker tone, which can be adjusted later. Identify its hue - the number is located on the outer rim of the wheel. Identify its purity – count the number of chips from the centre. Rotate the Plotter until the colour is covered by one of the mixing “paths” between the circle marked (k) and any one of the eight circles (c-j).

When you mix two colours (a-b) from one section of the Three-Section Colour Wheel: Red, Blue or Green, these combinations remain virtually the same purity as the colours used; no loss of purity occurs because no degree of the complementary colour is introduced. How to adjust a colour – if the colour you mix is a little too pure, just add the complimentary (k-c). If the hue is not quite right, use (a-b) to determine how to “pull” your mixture towards the colour you want.

Here is my recommendation for a comprehensive selection of hues: Yellow, Yellow Deep, a good red such as Cadmium Red, a Magenta such as Rose, a Violet, Ultramarine, Viridian, and of course, White. I do recommend using quality paints; good colour mixing is impossible with some of the cheap paints that many schools provide for their students. Note: in most oil painting techniques, Zinc White is recommended in preference to Titanium White. When using watercolours the white paper provides the white.

Select the colour you want to match. The example leaf’s hue is H340 and its purity is four places from the centre = P4. Record the numbers for easy future reference. Lifting the flexible Plotter makes it easier to identify colours.

To mix H280 from the Blue Section, we used the path (a-b) until (a-b) covered pigments we had, a magenta, Rose - and Violet; you may have a suitable pigment in your paint box.

Starting with Rose we added Violet a little at a time until it matched H280, our purple. If your first colour is a little too close to one end of the path, add some of the colour from the other end of (a-b).

Our final mixture is ready to check against our leaf. The tone-darkness or lightness- needed adjusting.

Here we are checking our final matched colour after adjusting for tone. We have added white to lighten.