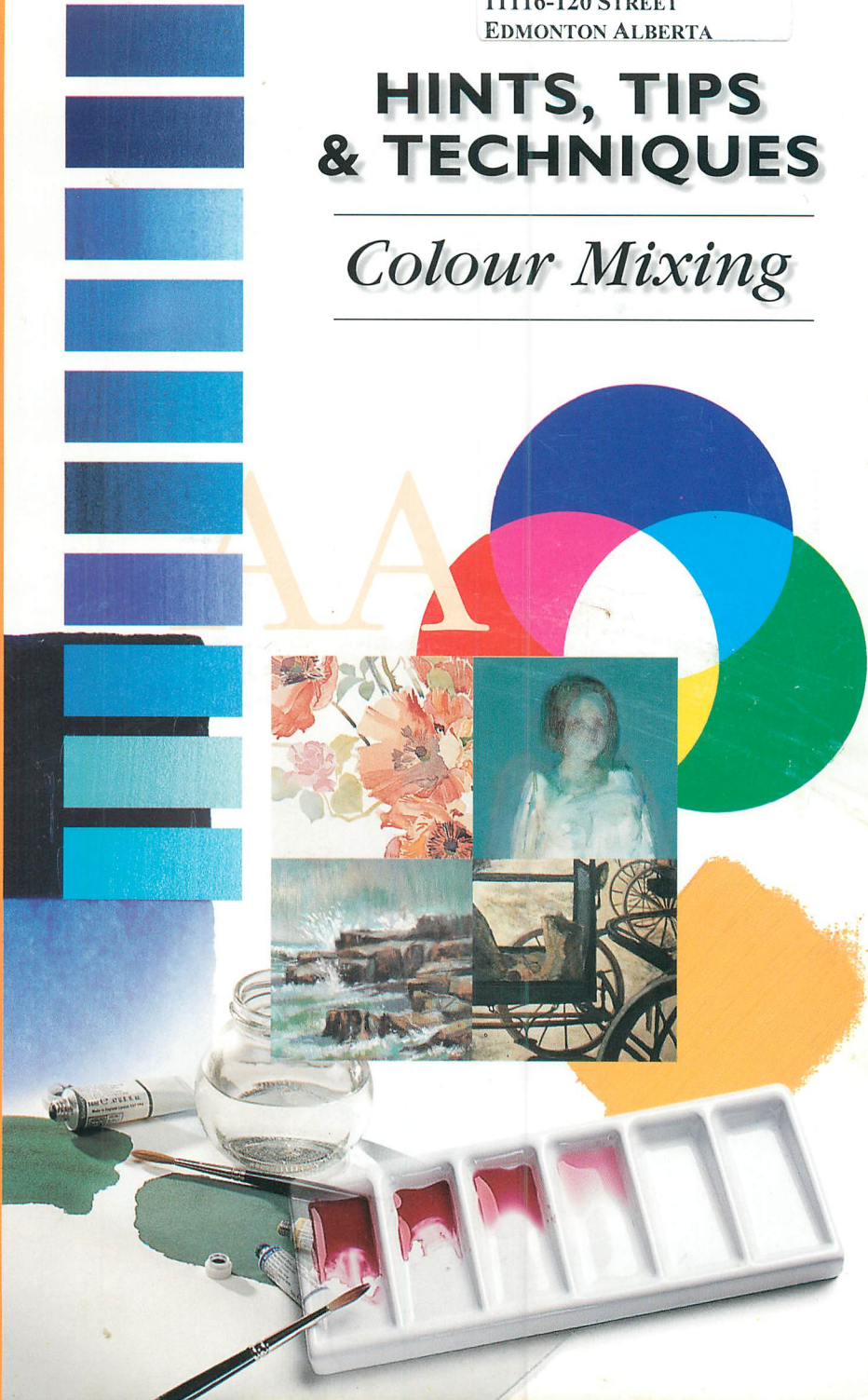


HINTS, TIPS & TECHNIQUES

DELTA ART & DRAFTING
11116-120 STREET
EDMONTON ALBERTA

HINTS, TIPS & TECHNIQUES

Colour Mixing



Hints, Tips & Techniques

Colour Mixing

Colour itself has been quite inseparable from art throughout the generations.

However, since the mid 19th century, Impressionist painters and subsequent movements, have very actively utilised colour theory to progress their art. The choice of palette and handling of colour in painting are significant subjects for the present day artist and this booklet aims to explore the subject and help in three ways:

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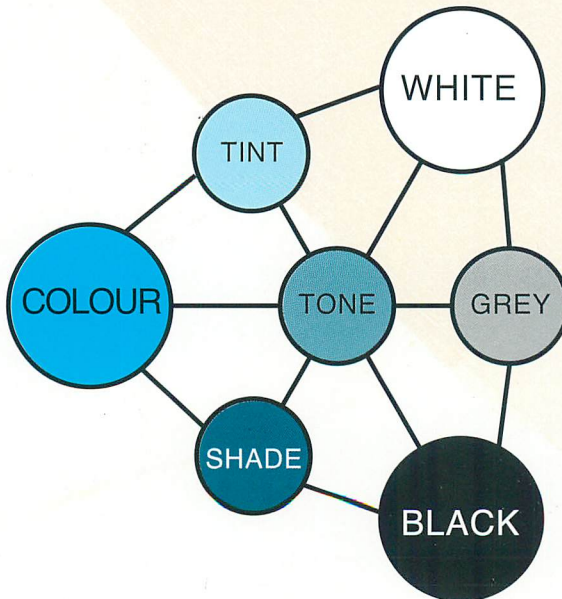
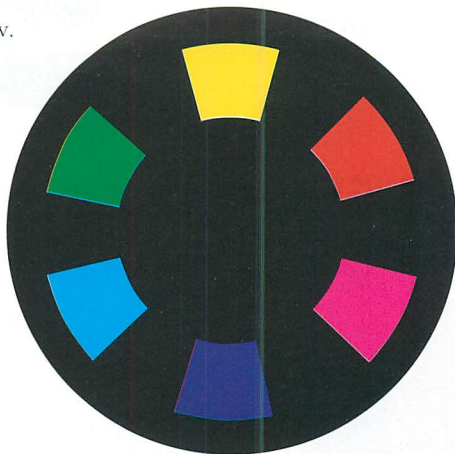


Diagram from 'Principles of Color' by Faber Birren



The Terminology of Colour theory

HUE: Colour, eg. red, blue or yellow.



CHROMA: The purity, saturation or intensity of a hue.

TINT: Hue mixed with white.

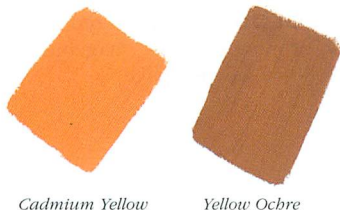


SHADE: Hue mixed with black.



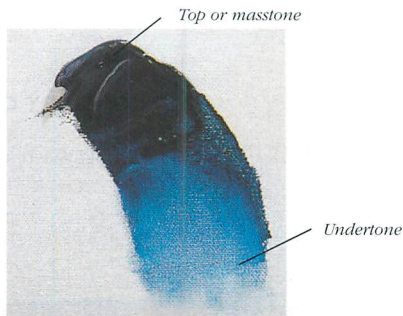
TOPE: Hue mixed with grey.

VALUE: The extent to which a colour reflects or absorbs light.



The Cadmium reflects a significant amount of light to give a high value whilst yellow ochre absorbs more light to give a lower value.

UNDERTONE: The colour of a pigment as it appears in a thin film; as opposed to its **TOP** or **MASSTONE** straight from the tube.



The Terminology of Colour theory (continued)

TINTING STRENGTH: A measure of the ability of a pigment to tint a white.



Winsor Blue (Green Shade)
high tinting strength



Terre Verte
low tinting strength

TRANSPARENCY: The ability of the pigment to transmit light and allow previous colour layers to show, eg. a violet can be obtained by placing a transparent red over a transparent blue, or vice versa.



Alizarin Crimson
over *French Ultramarine*

OPACITY: Opposite to transparency, eg. an opaque red will cover up any previous colour layers. (NB. opacity in water colour is low due to thinness of film)

Cadmium Red Deep
over *French Ultramarine*

TEMPERATURE: A colloquial term used by artists to indicate the colour relative to red (warm) and blue (cold).



PRIMARY COLOUR: In paints: red, blue and yellow, or more correctly, magenta, cyan and yellow (see also page 5).

SECONDARY COLOUR:

A secondary colour is the result of mixing two primary colours.

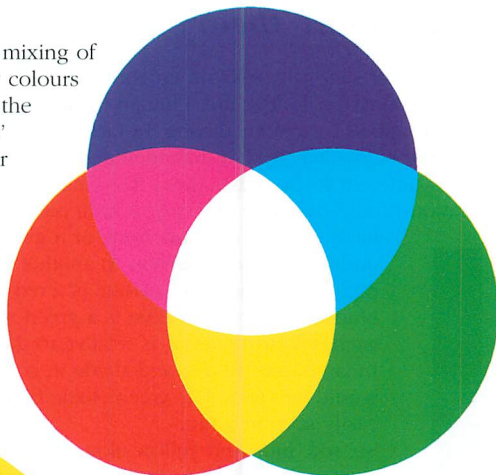


COMPLEMENTARY:

The complementary of a primary colour is the combination of the two remaining primaries, eg. in paints, blue and yellow mixed gives green, which is the complementary of red. Mixing complementaries, for example red and green, makes deep intense darks (blacks, browns and greys).

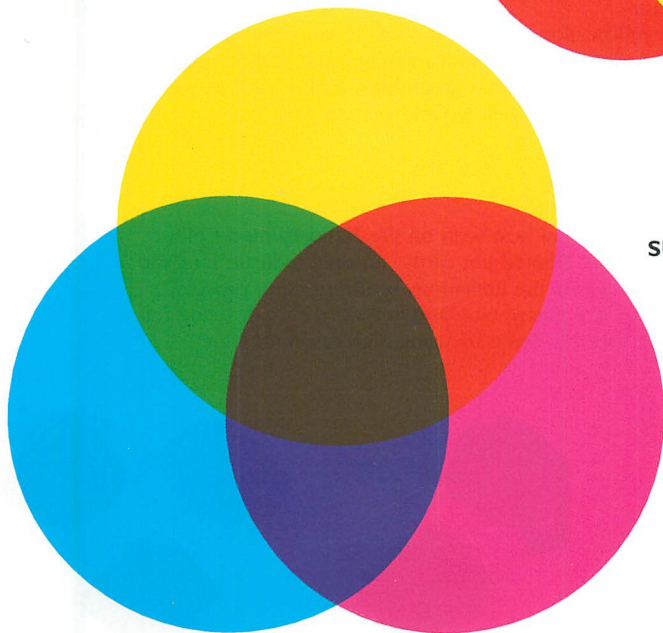


ADDITIVE COLOUR MIXING: The mixing of coloured light is ADDITIVE, secondary colours are purer, ie. away from black. This is the opposite to what happens when artists' colours are mixed and is the reason for much of the confusion regarding colour mixing.



SUBTRACTIVE COLOUR MIXING:

The mixing of pigments is SUBTRACTIVE, secondary colours become less pure, ie. towards black. This is the opposite to what happens when coloured light is mixed.



The Practical Applications

of Colour theory

The objective of colour mixing in painting is to create the largest number of options from the minimum number of colours and to be able to mix the colour you want. The ability to succeed depends initially on the quality of the colour.

Winsor & Newton was founded in 1832 by two artists determined to improve the range of colours available to painters and provide colours of greater permanence. Serving these aims decade after decade requires the understanding and application of colour theory by Winsor & Newton to their ranges.

In this section, the practical applications of colour theory are discussed, with reference to the colour names and characteristics of the different media.

Basic colour theory

For reasons of simplicity, we are taught when young that the three primary colours - red, blue and yellow - are all that are required for colour mixing. In fact, in pigment form every colour has both a masstone and an undertone which is different to the next colour. Looking at the illustration on the right, for example, a blue pigment will

have either a red undertone or a green undertone in comparison to another blue pigment. French Ultramarine is a red shade blue whilst Prussian Blue is a green shade blue. The undertone or bias of each colour however, is relative to the next one. For example, Indanthrene Blue, is red shade in comparison to Prussian Blue, but both would be classed as green shade blues. The colour bias is often most easily seen in a tint.

So, red, blue and yellow alone are not the whole story and in fact six colours provide a wider base for colour mixing: a red with a yellow bias, a red with a blue bias, a blue with a green bias, a blue with a red bias, a yellow with a red bias and a yellow with a green bias.

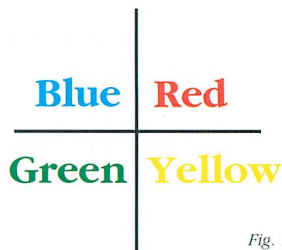
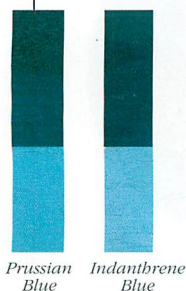


Fig. 1

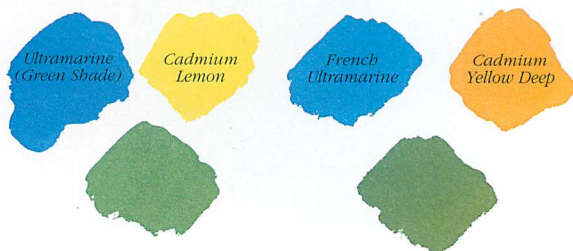


Applying this in practice

The hue and undertone of each colour are best seen on the Hand Painted Colour Charts produced by Winsor & Newton. Printed tint cards can only indicate hue and undertone as closely as is possible within the limitations of the printing process. So, in practice: if an artist wants to mix green; blue and yellow are used. Using figure 1 above, the greenest or cleanest green is made by using a green shade blue and a green shade yellow.

For example, in Artists' Water Colour, Ultramarine (Green Shade) and Cadmium Lemon.

If a red shade blue, French Ultramarine and a red shade yellow, Cadmium Yellow Deep were used instead, a dirty green would result.



Three primary colours

Of course, the use of three primary colours alone remains a good learning exercise. In this case, it is necessary to choose the red, blue and yellow which are the purest, eg. the red which is as far as possible mid way between a blue shade and yellow shade. This ensures the cleanest violets and the cleanest oranges when using only one red.

Theoretically, the three primaries are magenta, cyan and yellow. But, remember that each artists' colour has a masstone and an undertone; that artists require a package of handling properties and that permanence is also important. The recommended primaries therefore offer the best practical mixing properties combined with permanence wherever possible.

Listed below are the recommended primaries for each Winsor & Newton range:

Artists' Oil Colour: Transparent Yellow, Winsor Blue (red shade) and Permanent Rose.

Artists' Water Colour: Winsor Lemon, Winsor Blue (red shade) and Permanent Rose.

Finity Artists' Acrylic Colour: Azo Yellow Medium, Phthalo Blue Red Shade and Permanent Rose.

Artisan Water Mixable Oil Colour: Lemon Yellow, Phthalo Blue (Red Shade) and Permanent Rose.

Artists' Oilbar: Cadmium Lemon, French Ultramarine and Alizarin Crimson.

Griffin Alkyd Fast Drying Oil Colour: London Yellow, Phthalo Blue and Permanent Rose.

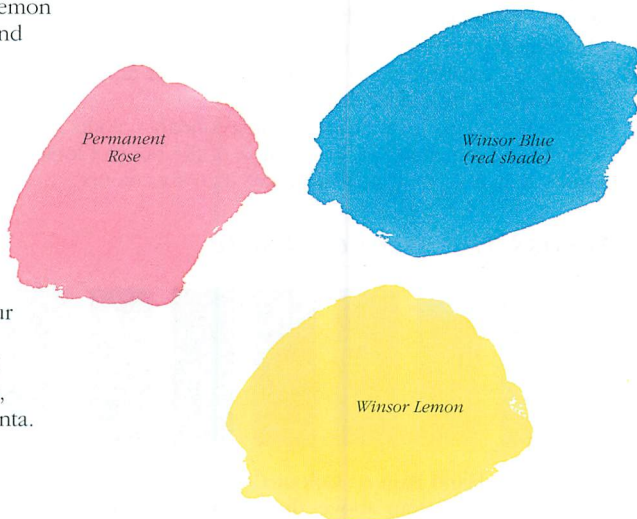
Designers' Gouache: Primary Yellow, Primary Blue and Primary Red.

Winton Oil Colour: Cadmium Lemon Hue, Phthalo Blue and Permanent Rose.

Cotman Water Colour: Lemon Yellow Hue, Intense Blue and Permanent Rose.

Galeria Flow Formula Acrylic Colour: Lemon Yellow, Winsor Blue and Permanent Rose.

It is often a surprise to artists that Cadmium Red is not recommended as primary red in a three colour selection. Permanent Rose produces much cleaner and brighter violets and oranges, because it is closer to magenta.



The six colour system

A broader spectrum can be mixed with six colours as discussed under *Basic colour theory* on page 4. As a learning exercise, the move from three colours to six also begins to introduce other variables like opacity, tinting strength, drying rate, and granulation, depending on the type of colour used. Here are the recommended six colour palettes;

Artists' Oil Colour: Winsor Lemon, Winsor Yellow, French Ultramarine, Winsor Blue (green shade), Permanent Rose and Cadmium Red.

Artists' Water Colour: Winsor Lemon, Winsor Yellow, French Ultramarine, Winsor Blue (Green Shade), Permanent Rose and Scarlet Lake.

Finity Artists' Acrylic Colour: Lemon Yellow, Azo Yellow Medium, Ultramarine Blue, Phthalo Blue Green Shade, Permanent Rose and Cadmium Red Light.

Artisan Water Mixable Oil Colour: Lemon Yellow, Cadmium Yellow Hue, French Ultramarine, Phthalo Blue (Red Shade), Permanent Rose and Cadmium Red Hue.

Artists' Oilbar: Cadmium Lemon, Cadmium Yellow Pale, French Ultramarine, Manganese Blue Hue, Permanent Magenta and Cadmium Red.

Griffin Alkyd Fast Drying Oil Colour: Cadmium Lemon, London Yellow, French Ultramarine, Phthalo Blue, Permanent Rose and Cadmium Red Medium.

Designers' Gouache: Lemon Yellow, Permanent Yellow Deep, Phthalo Blue, Ultramarine, Scarlet Lake and Alizarin Crimson.

Winton Oil Colour: Cadmium Lemon Hue, Cadmium Yellow Hue, French Ultramarine, Phthalo Blue, Permanent Rose and Cadmium Red Hue.

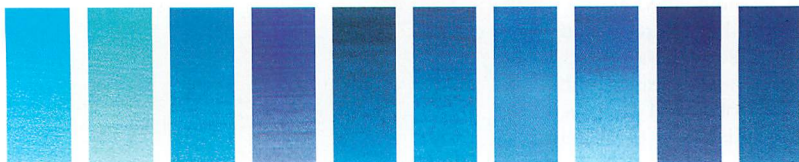
Cotman Water Colour: Lemon Yellow Hue, Cadmium Yellow Pale Hue, Ultramarine, Intense Blue, Permanent Rose and Cadmium Red Hue.

Galeria Flow Formula Acrylic Colour: Lemon Yellow, Cadmium Yellow Deep Hue, Ultramarine, Winsor Blue, Permanent Rose and Vermilion Hue.

Other palettes can be created by individual artists choosing a different selection of six colours. For example, both Winsor Blues rather than an Ultramarine and a Winsor Blue. The variations are endless!

Six colour systems give clean, bright secondary colours but of course this is not enough. The remainder of this section of the booklet looks at some of the many other reasons why artists will still use more than six colours.

Across the range of hue



Looking at a Hand Painted Colour Chart, or for example, the range of printed blues from Artists' Oil Colour above, the relative nature in hue and undertone of each colour is obvious.

In practice, the artist may already have Winsor Blue (Green Shade), yet might use another green shade blue, Prussian Blue, for its lower tinting strength.

The Winsor & Newton range must also offer all artists the opportunity to select the palette of their choice, whatever that may be. Some may prefer to use only a Cerulean Blue in their palette.

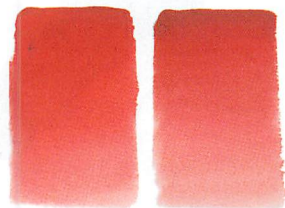
Additional colours within the same hue may also be used due to variations in opacity, tinting strength, drying rate, granulation etc. Manganese Blue Hue may be used for its transparency and Cerulean for its opacity, although they are both light blues. Equally, there are greens, violets and oranges which are unique within the spectrum and so artists will supplement their palette with those greens and violets, etc.

Different names

The names of colours can vary from range to range, for example, Winsor Blue in Galeria Acrylics and Phthalo Blue in Winton Oil Colour are both made from phthalocyanine blue. This is principally for historical reasons; colours were known by different names in different decades. The pigment content of each colour is usually detailed on the tube or may be found in our booklet, Notes on the Composition and Permanence of Artists' Colours or in the Winsor & Newton catalogue.

Single pigments

The common understanding that mixing too many colours together results in muddy browns is due to the subtractive nature of colour mixing with paints (see page 3). The use of single pigments wherever possible by Winsor & Newton in manufacturing is therefore an important benefit. For example, in Artists' Water Colour, Scarlet Lake and Winsor Red are included in the range because Scarlet Lake is very yellow whilst Winsor Red is very blue. The result is two distinct colour positions, each being brighter than an equivalent hue made from more than one pigment. The use of both colours will produce a wider range of mixtures, each being clean and bright.



Scarlet Lake

Winsor Red



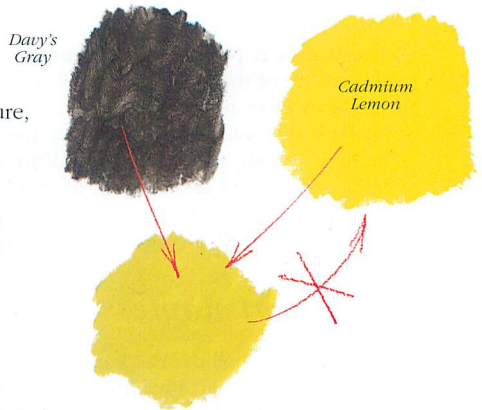
*Winsor Green
(Blue Shade)*

*Winsor Blue (Green Shade)
+ Transparent Yellow*

The same principle applies to single pigments in the green, orange and violet areas of the spectrum. These are usually known as secondary colours, however Winsor & Newton ensure that there are also as many single pigment 'secondaries' available to the artist as possible. A single pigment green will provide a more intense (ie. further away from black) colour than if the artist were to try to mix that same green made from blue and yellow.

Retaining intensity

As a general statement the more colours in a mixture, the nearer to black (muddiness) the mixture will become. When mixing you cannot obtain a colour of greater intensity by using a mixture of others. For example, no colour can be added to a mixture of Davy's Gray and Cadmium Lemon to regain the intensity of Cadmium Lemon alone.



Tinting strength

Every pigment varies in strength. Winsor Blue, for example, has a high tinting strength whilst Terre Verte has a low tinting strength (see page 2). In other words Winsor Blue will have a dominant effect on any mixtures whilst Terre Verte will not have a significant effect in mixtures.

Care is required in colour mixing to avoid the strong colours over-dominating the paint surface.

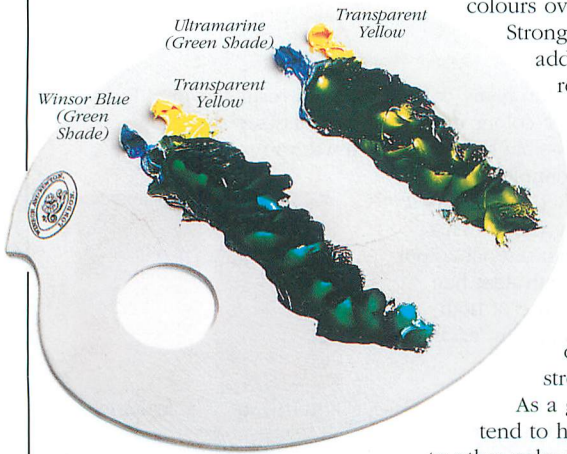
Strong colours can be controlled by adding small amounts to the mixture repeatedly until the required hue is reached. Alternatively, some artists may choose colours with lower tinting strength, for example, Ultramarine (Green Shade) in preference to Winsor Blue (Green Shade) as it has a lower tinting strength.

High tinting strength colours are often high key whilst low tinting strength colours are often low key.

As a general guide the following colours tend to have a high tinting strength, relative to other colours of similar hue:

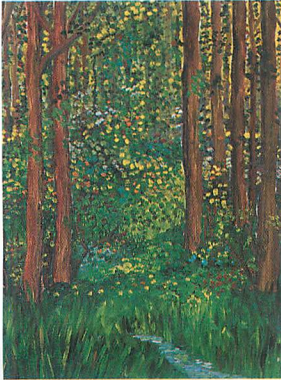
Benzimidazolones; Cadmium Yellows, Oranges & Reds; Winsor (Phthalo) colours; colours pre-fixed with 'Permanent' eg. Permanent Alizarin Crimson; Perylenes; Quinacridone colours; Prussian Blue; Mars colours; Burnt Sienna; Lamp Black and Titanium White.

NB. Artists' quality colours generally have higher tinting strength than the equivalent colour in the more moderately priced second quality ranges. Although this does of course have an effect on colour mixing, providing stronger mixtures, it should not be confused with the relative strength of each pigment. For example, Prussian Blue has a high tinting strength in all ranges.



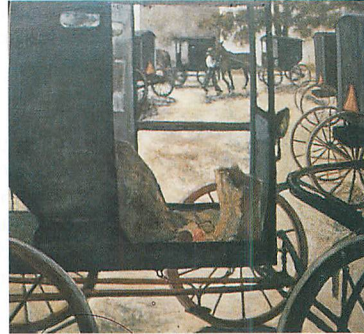
Value & chroma - 'high key and low key colour'

Each pigment has a relative ability to reflect or absorb light (value) and each colour has a relative intensity (chroma). Those which reflect a greater quantity of light or have a high intensity make 'high key' colours, for example Cadmium Yellow. Those which absorb less light or have a low intensity make 'low key' colours, for example Yellow Ochre (see page 1). Although many artists will balance high and low key colour across their paintings, successful works can exploit high key or low key colour throughout.



Alan Foster

High key picture



Wendell Upchurch

Low key picture

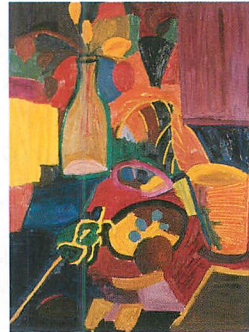
Transparency

Every colour is relatively transparent or opaque and this also affects colour mixing. Colours can be optically mixed by layers of transparent colours on the surface rather than directly on the palette. Depth is built up in paintings by this method, it is called 'glazing'. Flat areas of colour are achieved by using opaque colours such as cadmiums. The relative transparency or opacity of Winsor & Newton colours is noted on the colour charts.



Stephen Godson

Utilising glazing



Emma Pearce

Utilising opaque colours

The Practical Applications of Colour theory (continued)

The thickness of the paint film will of course affect the relative transparency. Thin films of colour will tend to be transparent either because they are physically thin or because the colour has been substantially diluted with medium before application. Thick films will always tend to be opaque because of the density of pigment on the surface.



Thin Film



Thick Film

French Ultramarine



Permanent Alizarin
Crimson

Thick films of transparent colours will actually appear almost black in mass. Transparent colours can only be seen when light is reflected back through the paint film from the support. In thick films, the light is absorbed and the colour appears dark.



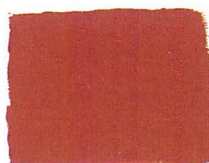
Permanent Alizarin Crimson
on black



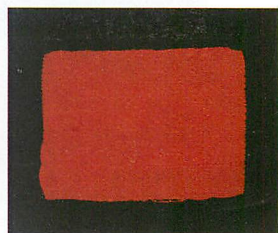
Permanent Alizarin
Crimson on white

When used thinly on black or dark backgrounds, transparent colours will not show as the light is absorbed by the dark surface - typically, a water colour on black paper. Transparent colours therefore appear brightest on white.

In comparison, opaque colours reflect the light from the colour itself and appear bright on any surface. Opaque colours will also appear very bright when surrounded by black because the light is being reflected by the colour and absorbed by the black.



Cadmium Red Deep
on white



Cadmium Red Deep
on Black

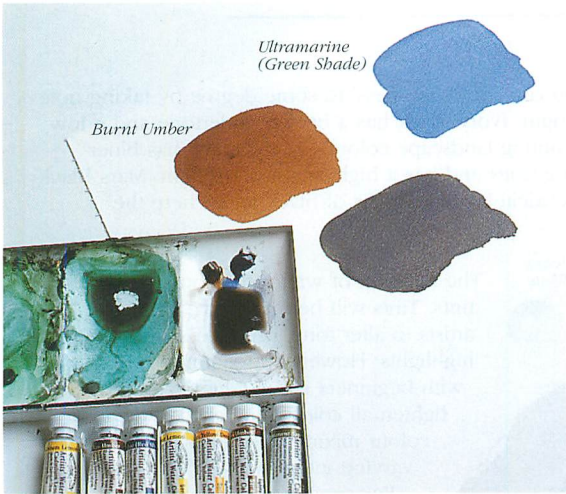
Temperature

The temperature of a colour is a term used by artists which refers to the general undertone in terms of red (warm) and blue (cold). The use of temperature descriptions in painting may be useful generally but it is not accurate in the more complex applications of colour mixing.

Complementary colours

Complementary colours are used in colour mixing for intense darks. Mixing red with green, blue with orange or yellow with violet will all give deep, dark colours. These intense darks would not be achieved simply by the addition of black.





For example, mixing Burnt Umber with Ultramarine (Green Shade) in water colour will give a very deep dark.

In addition, complementary colours are useful for toning down mixtures without dirtying them.

Complementary colours can also be used close together to produce particularly vibrant colours and can result in a picture which visually shimmers.



The use of black, grey and white

In general, the addition of black will dirty a colour. If the artist wishes to tone down a colour, Davy's Gray will achieve this. For example, Cadmium Lemon and black will tend to an olive green whilst Cadmium Lemon and Davy's Gray will tend towards a citrus green.



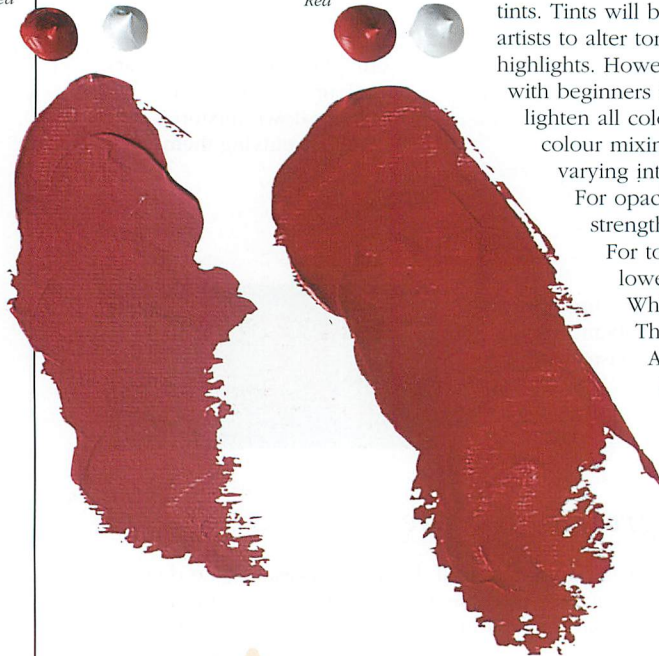
When using black as a colour, you can avoid 'dirtiness' to some degree by taking note of the colour bias and tinting strength. Ivory Black has a brown undertone and a low tinting strength, most suitable for tinting landscape colours. Lamp Black has bluer undertone, more suitable for tinting skies and has a higher tinting strength. Mars Black is the densest, most opaque black, ideal for large areas of black and where the blackest black is required.

Pyrrole Red

Titanium White

Pyrrole Red

Mixing White



The addition of white to colours produces tints. Tints will be imperative for many artists to alter tone, produce shadows and highlights. However, a common mistake with beginners is the reliance on white to lighten all colours rather than develop colour mixing skills to produce hues of varying intensity.

For opacity and high tinting strength, Titanium White is best.

For toning down a colour the lower tinting strength of Zinc White (in oils) is excellent.

The equivalent in Finity Artists' Acrylics is called Mixing White and in water colour, Chinese White.

Effect of mixtures on lightfastness and permanence

On lightfastness; A mixture can never be more permanent than the original two colours. If a fugitive pink is used with a blue to make violet, the pink will fade over the years, leaving the blue.

Fortunately, more and more permanent colours are becoming available, so concerns regarding permanence are lessened.

Those colours which are rated AA, A, **** or ***

are recommended as permanent for artists' use.

On permanence; Almost all Winsor & Newton colours can now be safely intermixed without affecting permanence. However there remain three colours which are not compatible with Flake White (or other lead whites), Vermilion Hue in Winton and Griffin and London Red in Griffin.

Practical Tips: *Getting Results!*

New colours for the 21st century

The founders of Winsor & Newton would have been delighted with the opportunity provided by the development of pigments throughout the 20th century. Their determination to improve the range of colours available to painters and provide colours of greater permanence has continued and in the early 1990's, artists' quality oil, acrylic and water colour from Winsor & Newton all benefited from updated pigmentation. Many of the new pigments are complex chemicals with high tinting strength, high transparency and very complicated names! Listed here is a precis of suggested uses for the new colours from Winsor & Newton.

Benzimidazolone Maroon;

A dense, transparent, blue shade maroon, excellent for darks and shadows.

Benzimidazolone Orange;

A bright, transparent, single pigment orange.

Bismuth Yellow;

Bright, semi-opaque, permanent yellow which gives bright mixtures.

Cobalt Blue Deep;

A red shade cobalt blue. Granulating in water colour.

Dioxazine Purple;

Strong, mid shade violet.

Graphite Grey (Finity Artists' Acrylic);

A single pigment dark silver grey, excellent for tonal mixtures.

Green Gold (Artists' Water Colour);

A bright yellow shade green. A strong useful mixing colour.

Indanthrene Blue;

Intense dark blue, good sea colour. Makes excellent darks mixed with Raw Umber.

Manganese Blue Hue;

Perfect summer sky colour. A very light, transparent blue which is not a tint.

Naples Yellow Deep (Chromium/titanium oxide);

An excellent, tonal mixing colour. A single pigment Naples Yellow unique to Winsor & Newton.

Perinone Orange (Finity Artists' Acrylics);

A very red shade, transparent, single pigment orange.

Permanent Alizarin Crimson;

A permanent alternative to the very popular blue shade Alizarin Crimson.

Permanent Sap Green;

A permanent alternative to the very popular landscape green.

Perylene Maroon (Artists' Water Colour);

Dense, strong, very transparent red maroon. Excellent for darks and shadows.

Perylene Red (Finity Artists' Acrylics);

A blue shade, transparent, single pigment red.

Pyrrrole Red;

A mid shade, strong, single pigment red.

Quinacridone Burnt Orange (Finity Artists' Acrylics);

A strong, transparent red earth colour.

Quinacridone Gold;

Strong, transparent mustard-orange colour. Gives deep oranges and greens in mixing.

Thioindigo Violet;

Single pigment deep red shade violet in Artists' Water Colour.

Transparent Yellow;

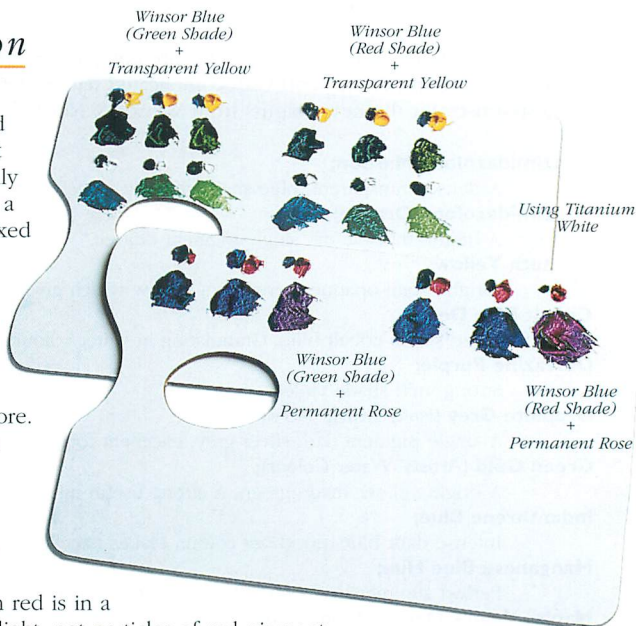
Particularly transparent, bright yellow, makes bright greens on mixing.

Get those paints out

Nothing can beat getting your paints out and working your way through this booklet. This will turn colour theory into a useful reality for you. Here are a few tips to help you on your way.

Beat the confusion

It is normal to feel confused about all this green shade, red shade business when you first read about it. Dark blue usually just looks dark blue! So, have a look at both Winsor Blues mixed with Transparent Yellow. Mix various proportions on your palette and the differences between the greens will be visually obvious. Add some Titanium White and the differences will show even more. Repeat the exercise with both Winsor Blues mixed with Permanent Rose and observe the violets. Remember that colour theory is all bound up with the physics of light and explanations about how much red is in a blue is about wavelengths of light, not particles of red pigment in the Winsor Blue.

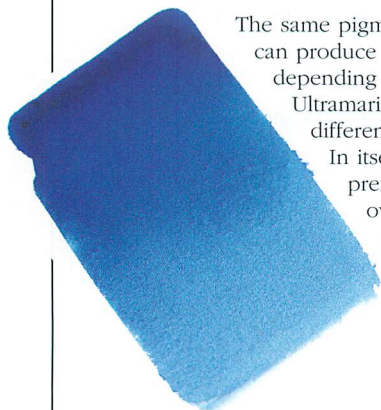


Different ranges

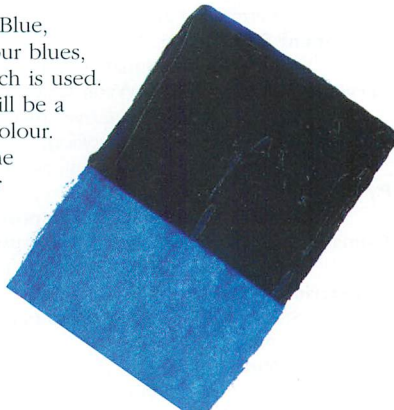
The same pigment, eg. Ultramarine Blue, can produce slightly different colour blues, depending upon the binder which is used.

Ultramarine in water colour will be a different colour than in oil colour.

In itself, this can lead to the preference of one colour over another in different ranges.



Water colour

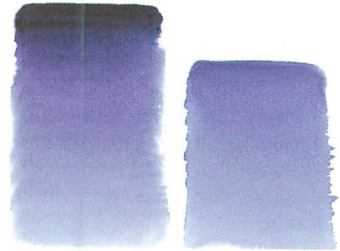


Oil colour



The difference between an artists' colour and the student grade will also have an affect on colour mixing. The higher pigment strength in the artists' grade will result in higher intensity colour and greater tinting strength, eg. Ultramarine in Artists' Water Colour versus Ultramarine in Cotman Water Colour. Try mixing a colour with first artists' quality and then the second quality equivalent to show the different results.

In water colour, tubes will tend to give stronger colours than pan colours. Experiment with the same colour from the artists' range in tube and pan form to experience the differences. Both will work the same if the tube colour is highly diluted or the pan colour is worked for a little longer.



Winsor Violet Tube Winsor Violet Pan

And finally, manufacturers all work from their own formulations and the same pigment type used by two different manufacturers will produce two different colours.

Proportions used in colour mixing

A secondary colour is not necessarily achieved by mixing equal proportions of primary colours. Using the three primary colours in the range of your choice, combine the primaries in different proportions to show the spread of possible colours. eg. mix red with yellow to show the range of oranges produced. One of them will match the 'secondary' orange from the colour wheel on page 1.



Secondary Orange



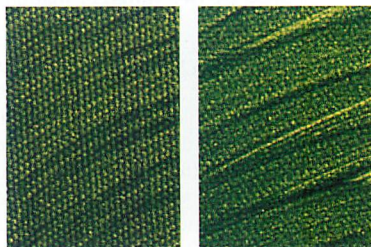
Thickness of film

The thickness of the paint film will affect the colour. A very dilute water colour wash will give a totally different colour than a heavy wash. In water colour particularly, water is a great colour mixing tool. Take some Permanent Alizarin Crimson and make a wash with an equal amount of water to colour. Repeat the exercise by continuing to add 100% every time and paint the colour out. The variety in hue from one colour is amazing.

Colour and texture of surface

What may seem a minute variation between two canvas textures or the colour of two water colour sheets can magnify itself when colour is applied. Increased canvas texture will tend to subdue the colour, bright white paper will give very bright washes. Any surface which is over-absorbent, for example paper used for oil colour, will result in dullness of the colours. Choose a transparent colour, decide on a method of application and build up a comparison library by painting out this colour onto every new surface which you come across. You'll be amazed by the difference!

Sap Green, Oil Colour

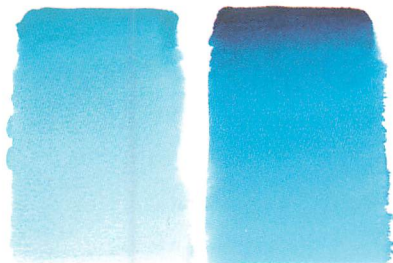


Sap Green, Water Colour



Texture of pigments

Different pigments can give different textures which in turn affect the appearance of their colour. The most noticeable examples are water colours which granulate. These colours separate on the paper to give a mottled effect. When colour mixing, granulation can subdue colour mixtures. Granulating colours are marked on the colour charts.



Cerulean Blue
(granulates)

Winsor Blue
(Green Shade)
(smooth wash)

Where you paint

The light in which you paint will affect your colour enormously. Wherever possible, paint in daylight. North light is the preferred studio light because it is the most constant. In the summer, avoid painting in direct sunlight or your painting will be too bright indoors. If painting in electric light, daylight bulbs are best. Conventional tungsten lighting is yellow whilst fluorescent strip lighting tends to be blue. You simply can't see which colours you're really mixing.

and finally.....

Anyone can paint, you don't need to know all about colour mixing before you start. But, once you're painting and enjoying it, you might start to wonder why some things don't work and this booklet will help. The most important thing is to enjoy painting!

Where can I find out more about painting?

Ask your retailer for free colour charts, product information leaflets and look out for the other booklets in this series.

Visit our website on the Internet, our address is <http://www.winsornewton.com>.



Price

Other titles in this series:

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**Notes on the Composition & Permanence
*of Artists' Colours***

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