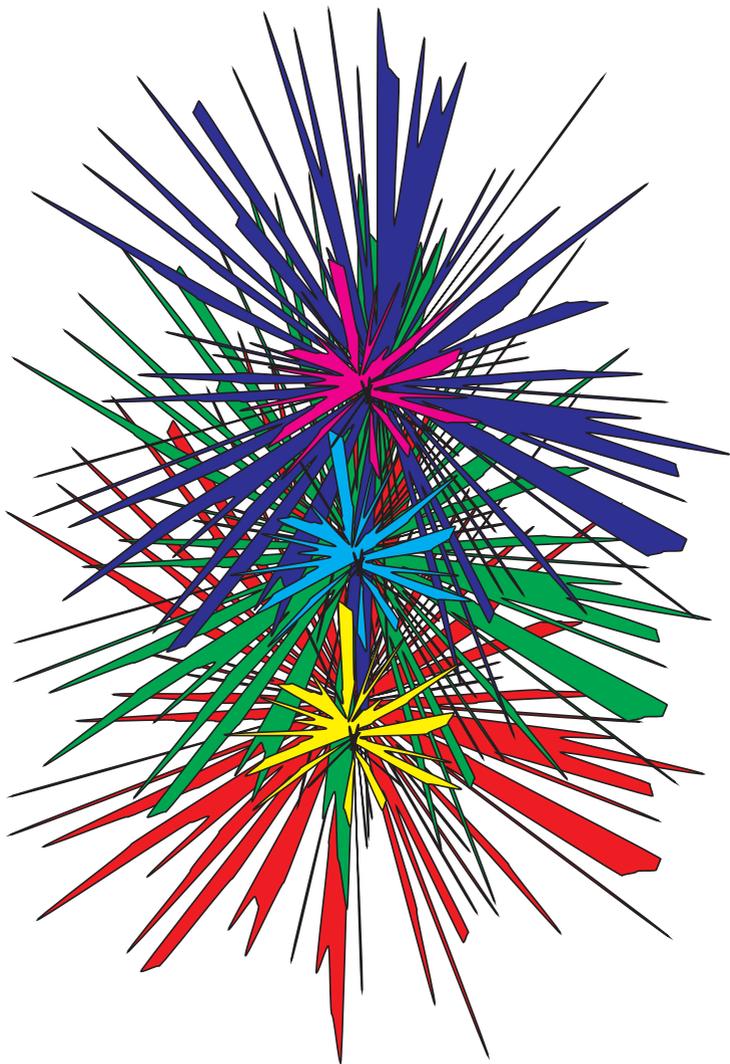




Colour Theory



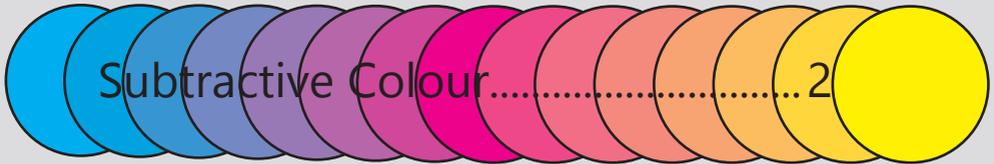
By Steve Pimblett

08/09/14





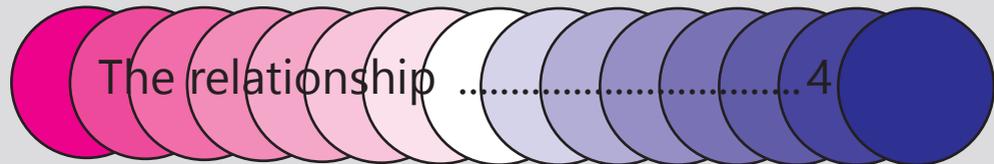
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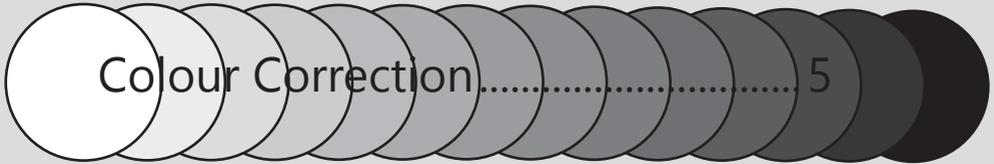
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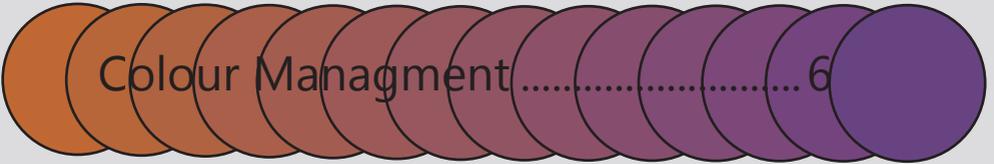
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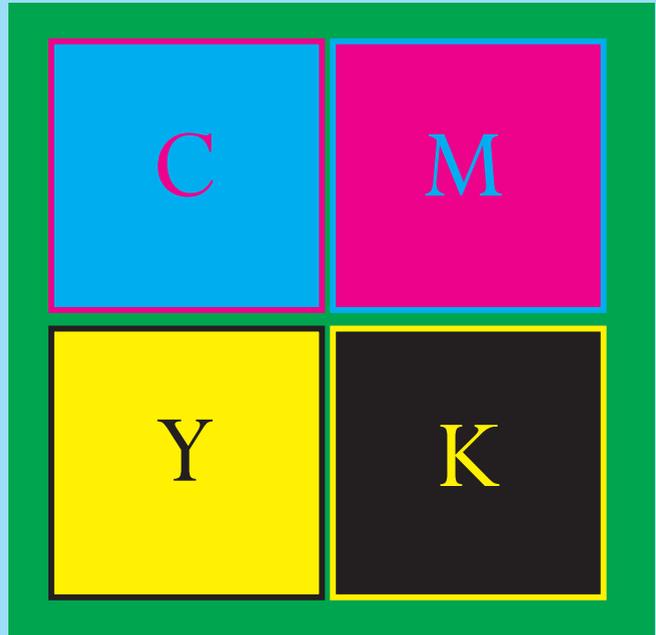


Colour Matching 7



Subtractive Colour

What is subtractive colour? Simply put, subtractive colour is what happens when we start with white and end up with black. It is the result of mixing colours using paint or inks in printing and as colours are added, The resulting tones and hues get darker and the more you add the closer to black you get.



The primary colours used in this process are Cyan, Magenta and Yellow with the addition of Black because Cyan, Magenta and Yellow combined don't create a dark enough black. Using these colours gives us the 4 colour process better known as CMYK (K representing black).

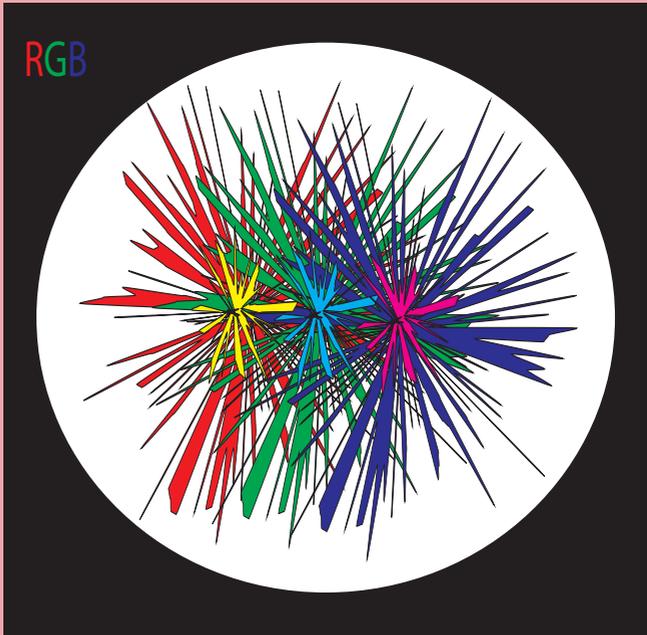
An example of this is when a child draws coloured shapes on a white piece of paper and the colours overlap creating darker blends of the colours. This illustrates the principle of subtractive colour.



Additive Colour

What is additive colour?

Additive colour is based on red, blue and Green. The human eye can see red, green and blue colours because of the way that light reflects off the surface of the component's of the eye.



Additive colour is using red, green and blue and adding light in order to create

a range of colours from darkness. The first uses of this model would have probably been used in theatre lighting and the use of cellophane filters placed over the white lights to create colour spectrums.

The same is true these days and simple forms of these filters can be used to create effects in photography and in editing software. The rise of the RGB colour spectrum coincided with the evolution of electronic media.

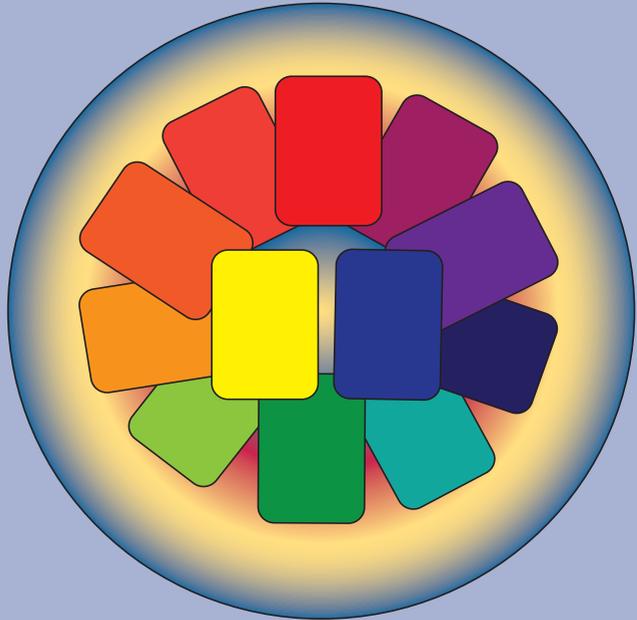




The relationship

The relationship between RGB and CMYK models and how it affects print and design

RGB colour is how we see the world and it is also how computer monitors, cameras and anything else that uses light produce colour.



When we want to take the colour that we can see in the real world or on a television screen etc. and reproduce that colour onto paper or another printed medium we have to use inks and dyes and paints which have a more limited colour range represented by the CMYK model.

What happens when we take CMYK colours and attempt to recreate what we can see is that sometimes the colours can't be faithfully reproduced because of these limitations and so what we end up with is close but not always exactly what we are after.



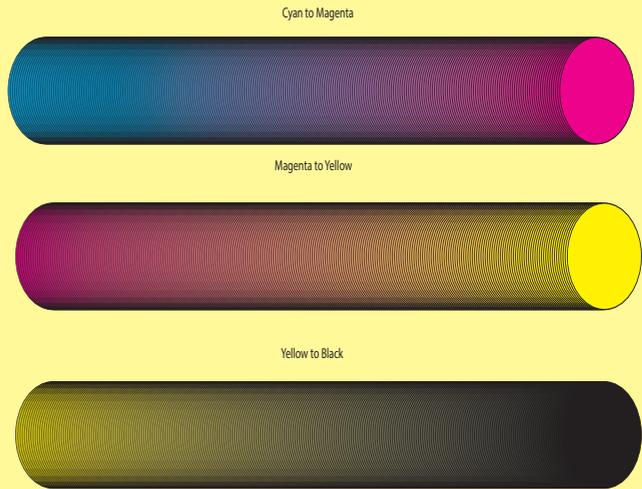


Colour Correction

A lot depends on the surface that you want to print on. Different surfaces are able to represent more or less of the colour range.

An example of this is printing a photo out on matt paper resulting in a flatter look than using shiny photographic paper. The hue of a colour is what we see as the actual colour.

CMYK Spectrums



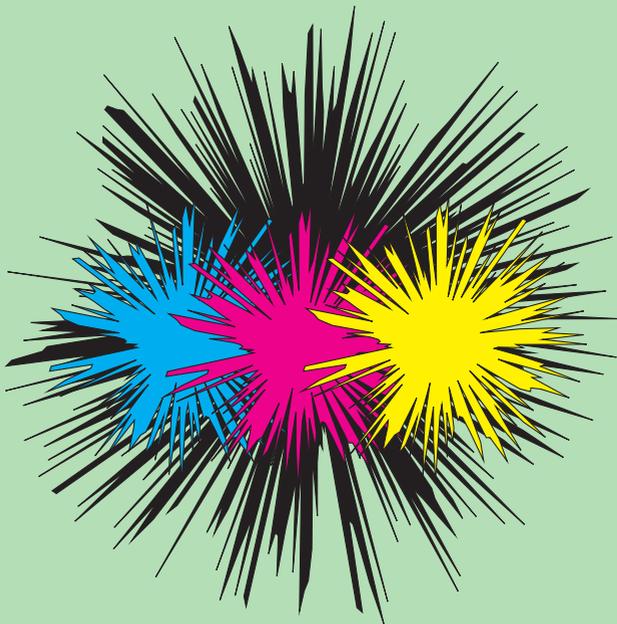
This is affected by the value or tone of the hue which is represented by how light or dark the hue is without taking the actual colour into consideration. Value is represented by greyscale and ranges from white through to black and all of the greys in between and the saturation of the hue/colour which refers to how intense the hue/colour is in comparison to white. Greyscale consists of desaturated hues/colours in shades of grey using varying levels of black and white





C colour Management

Once the colour model is chosen colour management is achieved by using applications and device drivers within the operating systems being used to achieve standard ICC results.



The following four procedures ensure effective colour management

Image input

Is where digital information is recorded by an input device i.e. scanner, camera and then converted into RGB colour coordinates.

Colour correction is done within a colour space Lab which allows for the digital image information to be tweaked

Conversion to output where the RGB digital information is now converted to CMYK ready to print

Soft proof where a single print is produced from the digital information to check the colours of the layout before the print run.





Before the International Colour Consortium (ICC) was formed, reproducing colour was a bit of a hit and miss affair. The ICC got together to solve this problem and to make sure that accurate colour representation was possible right through the digital and printing range allowing people to see a colour on a computer monitor and have it reasonably accurately recreated on a t-shirt.

They set out a standard where all devices would use a common set of guidelines that would allow the colour metadata to flow relatively seamlessly from device to device. This metadata can be edited with software packages that are linked to ICC standards like the Adobe suite etc.

There are many colour spaces used today, most of which were based on the CIEXYZ colour space which was based on how people perceive colour and that is the basis for just about every other colour space today.

RGB holds single values for red, green and blue. RGBA includes alpha waves to show transparency.

CMYK colour is created by using various kinds of inks/dyes or paints needed to reflect light from the substrate/material being used to give specific colours.

Commercial systems - The Munsell colour system, The Pantone Colour Matching System and The Natural Colour System

