

Obtaining ideal colour

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TOPICS COVERED

- The spectrum
- How we see in colour:
 - colour vision; colour blindness; colour temperature; colour temperature and white balance; colour measurement; colour space; Photoshop colour settings
- Thinking about colour
 - Hue; saturation; brightness; other terms
- The colour wheel
 - Colour harmony; colour contrast; perceived colour
- Colour associations
- Printing – getting the colour right
- Colour v monochrome
- How does this help our photography

ROUGH TIMINGS

- 7.30 Overview of colour and colour management
- 8.30 Short break
- 8.40 Discussion and reviewing images
 - From external sources
 - From images brought in by participants
- 9.45 Review and finish

THE SPECTRUM

- White light can be split by a prism into colours ROYGBIV
- This is the visible spectrum ranging from 400 m μ (indigo) to 700 m μ (red).
- Beyond red is Infra Red (700 m μ to 1000 m μ) and radio waves (up to several km)
- Below indigo is Ultra Violet (300 m μ to 400 m μ) and then X-rays and gamma rays.
- Photographic and other lenses use combinations of glasses of different refractive indices to enable different colours to focus in one plane – achromatic (two colours), apochromatic (three colours).

Note – 1 μ = 1 micron = 0.0001 mm: 1 m μ = .0000001 mm = 10 Angstrom)

COLOUR VISION

- The retina of the eye contains rods (some 120m) and cones (some 8m). The cones are mainly concentrated in the fovea and are colour sensitive, giving fine detail and colour when we look directly at objects.
- The rods are not colour sensitive but respond better to low light levels. The rods give us our peripheral vision.
- In evolutionary terms (and photographically) colour gives us improved discrimination to see and identify objects.

COLOUR BLINDNESS

- 12% to 20% of white males and a much smaller proportion of females suffer from colour blindness, usually mild red/green.
- Persons with this disability prefer bright colours, can't easily distinguish colours in dim light (e.g. your sock drawer) and cannot easily see red against green, e.g. red apples amongst green leaves.
- Simple test provided (or go on-line)

COLOUR TEMPERATURE

- Perceived colour depends on -
 - Light source
 - The absorption and reflection of light from an object
 - The observer – human eye, digital camera, film camera
- The light source may have a continuous spectrum (e.g., sunlight) or a restricted spectrum (e.g., coloured light, sodium street lights). Continuous light can vary in the predominant wavelength or colour and this is defined in terms of colour temperature (the temperature of a 'black body' emitter). Some typical colour temperatures are –
 - Tungsten lamp – 2800 K
 - Sunset – 3000 K
 - Photoflood lamp – 3200 K
 - Electronic flash/average noon daylight – 5500 K
 - Noon sunlight/international white light – 6500 K
 - Overcast sky – 7000 K
 - Clear blue sky – 10000 K



COLOUR COMPENSATION

- Use daylight or artificial light film
- Use a correction filter –
 - open shade – 81B or 81C warm up
 - photoflood lamp – 80A blue
- On a digital camera set an appropriate white balance
 - Auto/shade/daylight etc
- Leave alone and correct in Photoshop
- Leave alone, take in camera raw and change in raw converter

Recommendation – shade or auto and camera raw. Check camera settings

COLOUR MEASUREMENT AND SPACE

- Colour measurement
 - RGB – red green blue, used for emitted light
 - CMYK – cyan magenta yellow black – used for inks
 - Others you may encounter –
 - HSB – hue saturation brightness
 - Lab – luminosity and a (red-green) plus b (blue-yellow)
- Colour space
 - Adobe RGB (1998) – use for printing as it matches the colour gamut (colour range) available from inkjet printers
 - sRGB- a smaller space- use for images destined for web, e-mail and projection as it matches the more restricted colour gamut of monitors and projectors

Note – if you have an image in Adobe RGB (1998), convert to sRGB when submitting to competitions involving digital projection

PHOTOSHOP PRINTER SETTINGS

Edit menu -> Colour Settings. Use advanced or additional options to access full range. Recommended settings are -

- RGB – Adobe RGB (1998)
- CMYK – US web coated SWOP v2
- Grey – dot gain 20%
- Spot – dot gain 20%
- Colour Measurement Profiles
 - RGB – preserve embedded profiles
 - CMYK – preserve embedded profiles
 - Grey – preserve embedded profiles
- Profile mismatch – tick “ask when opening” and “ask when pasting”
- Missing profile – tick “ask when opening”
- Conversion engine – Adobe
- Rendering intent – Perceptual (some prefer relative colourimetric)

PHOTOSHOP RAW CONVERTER

Workflow Settings

- Drop down menu accessed by clicking at bottom of window
 - Space – Adobe RGB (1998)
 - Depth – 16 bit
 - Size – as per camera file
 - Resolution – doesn't really matter but I set to my printing res of 270 dpi

THINKING ABOUT COLOUR

- Lots of terms – Tint, Tone, Shade, Intensity, Chroma, Value,
- Suggest use:
 - Hue – another name for colour
 - Saturation – the intensity/dullness of a colour
 - Brightness – lightness/darkness of a colour
- Explore these using the 'Colour Picker' in Photoshop – click on 'Foreground Colour' in the Tools Palette (usually on left side of window)
 - Hue – vertical bar on R
 - Saturation – increases L to R in colour box
 - Brightness – Increases bottom to top in colour box
- Look at the HSB, RGB and Lab values for any selected colour

Note – you can change the way the colour picker is displayed by clicking the radio buttons on the right of the box

MONOCHROME v COLOUR

- Monochrome (a single colour, toned image) works best when there are significant tonal differences within the image.
- Colour can work even when there are only small tonal differences within the image

COLOUR WHEEL

- Related colours are adjacent
- Contrasting colours are opposite
- Primary colours cannot be mixed from other colours – RGY
- Complementary colours can be obtained by mixing, e.g.
 - $R + Y = O$
 - $B + Y = G$
- Colour harmony – adjacent hues, varying saturation
- Colour contrast – opposite hues
- Perceived colour – can depend on adjacent, e.g. desaturated red next to its complementary (green) will look more red: if next to orange will look less red.

COLOUR ASSOCIATIONS

Useful in images to put over an idea or concept. For instance we associate -

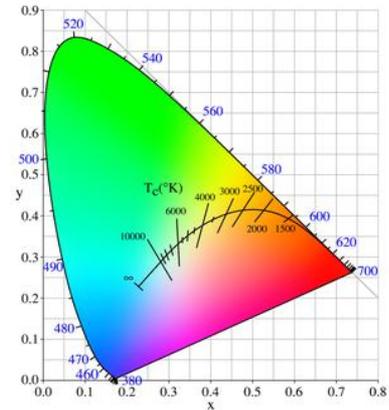
- Red – fire, blood, passion, aggression
- Orange – vitality, sensuality, security
- Yellow – sunshine, laughter, happiness
- Green - environment, stability, harmony
- Blue – water, sea, sky, infinity
- Purple – royalty, mystery, spiritual
- Pink – soft, sensual, romantic
- Brown, beige, cream – earth, stone
- Black – funereal, oppressive
- Grey – sober, subdued, bad weather
- White – purity, peace, cleanliness
- Combinations – e.g. black/yellow – stinging insects
- Warm, aggressive colours – red, orange, yellow
- Cool, receding colours – green, blue, purple

COLOR PRINTING

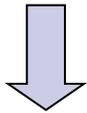
- See separate sheet

COLOUR PROFILES

- A major subject in its own right and very complex
- Each piece of kit can reproduce colour slightly differently
- Raw converter allows sophisticated colour adjustment but useless if screen does not match printer (or projector)
- Ideally camera, monitor, printer (and each paper), and projector should be colour calibrated so that they match
- Thus minimum colour matching necessary
 - Monitor
 - Hire, or buy equipment
 - Make sure position and lighting good
 - Printer/paper
 - Manually adjust- fiddly and not accurate
 - Can buy "standard" profiles
 - Better to use specialist service
- Make sure the profiles are set up properly in your software and changed when you use different paper



COLOUR PROFILES



s RGB or adobe RGB

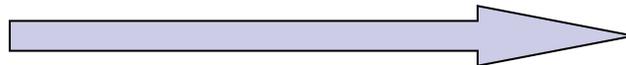


Monitor profile sets
“standard” colour
reproduction but will be
influenced by lighting and
monitor position

Print profile 1



Print profile tries to “match”
monitor colour to printer/
paper combination



Print profile 2



HOW DOES ALL THIS HELP OUR PHOTOGRAPHY?

- Evaluation of images brought by leader
- Evaluation of images brought by participants

HOMEWORK

1. Review material from this session
2. Take at least 2 images showing use of the rule of thirds for reviews at next session
 - One portrait format
 - One landscape format