Making Good Prints

- Preparing for third party printing
- About image resizing
- About colour, colour space and gamut
- Printing your own

From Eye to Print

- See a subject worth shooting
- Compose and shoot
  - If possible, shoot a standard grey scale or colour chart so that you can adjust the white balance
- Download and develop in LR or Photoshop
  - Pay attention to colour balance
- Choose a paper type and size
- Either:
  - Send it away to a print shop
  - Print it yourself

Size, Paper, 3rd Party Printer

- Let's make a print to fit within 40cm x 50cm
- We'll choose a satin finish paper
- We'll send it to Digital Works

READ the instructions on their web site and take them seriously:

Note that they want at least 200 pixels per inch

Note that they want JPEG images only

Note that they want sRGB tagged images only

Download their provided printer profiles and install them as described on their web site.

Note their suggested Rendering Intent (Relative Colorimetric).

About Image Size

- Digital images consist of pixels
- Pixel dimensions is the fundamental way of expressing digital image size
- When you display digital images you have to match the image size to the display device

- Example: our projector has a maximum possible number of pixels it can display: 1920 x 1080. Therefore you should resize your images to fit within this boundary

About Print Size

- Print size is specified by the print dimensions: for example I might want a print for block mounting within 50cm x 40 cm.
- Printers work by spitting out dots of ink onto paper. The closer together the dots are, the better the print looks. This is especially important for fine detail.
- Printing sharp text requires dots that are very close together, whereas printing photographs is much less demanding.
- The closeness of the dots is specified by the number of dots per inch (dpi). This is called the dot density or print density.
- The printing company will tell you what value to use.

Colour Space

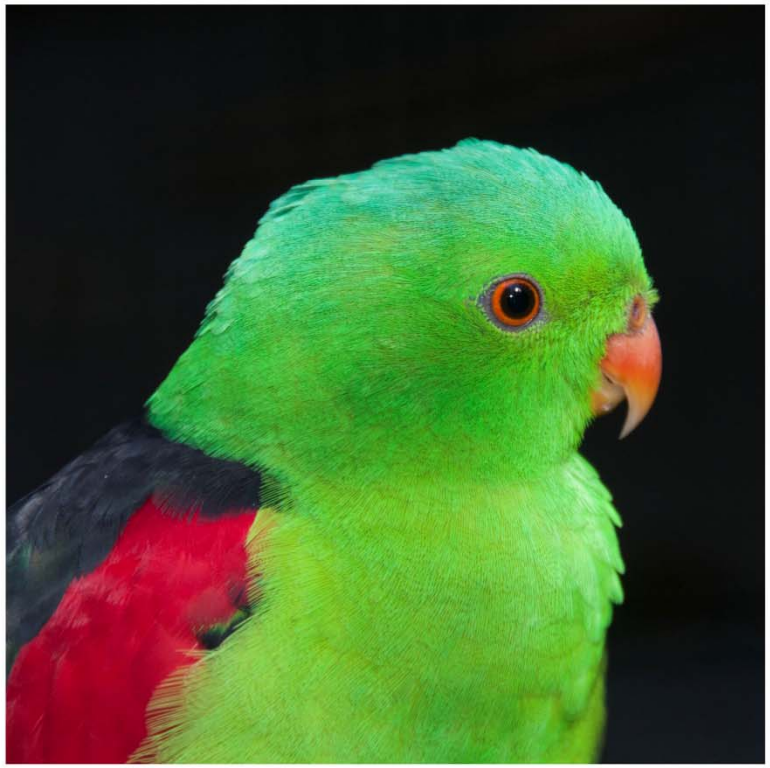
- There are three colour spaces that photographers commonly use: sRGB, AdobeRGB and ProPhotoRGB
- Lightroom works in ProPhotoRGB
- You can set Photoshop to work in whatever you want BUT if you use Photoshop in conjunction with Lightroom it makes sense to use ProPhotoRGB
- You have to change the colour space of an image to sRGB deliberately.

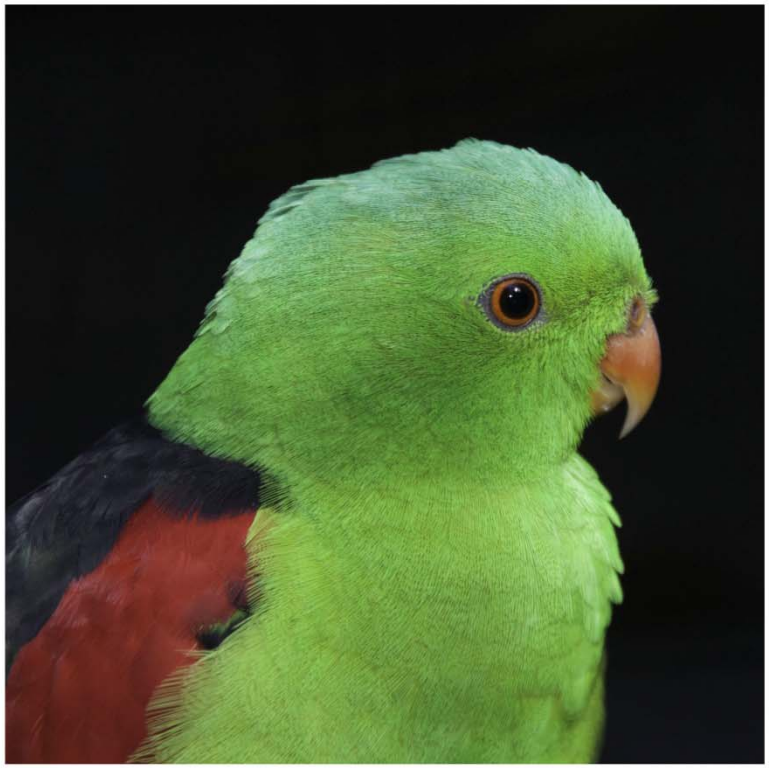
Finally

- Save the image in JPG format at the highest quality.
- Send it or take it to the printer.

- Note: Always talk to the printer.
- Find out what your chosen printer's standards are.
- Ask them what their preferred printing resolution is.
- Ask if they can use adobeRGB as the colour space and use this if they can.
- If they don't know, don't care, or don't understand the questions, find another printer.

Wrong Profile - 1





Wrong Profile - 2

Resizing and adjusting colour space

- In Photoshop
  - Use Image/Duplicate and rename the file to something like: original file_FOR_PRINT
  - Close the original image
  - Use Image/Image Size
    - UNCHECK Resample Image. Set the desired Resolution (pixels / inch) and click OK.
  - Use Image/Image Size again.
    - CHECK Resample Image, make sure the Link icon is selected and then type in the desired Width or Height as appropriate. Click on OK.
  - Use File/Scripts/Image Processor and complete the dialog box. Make sure that you choose the source and destination files correctly. Check Save as JPG, set Quality to 10, check Convert Profile to sRGB. Uncheck Resize to fit. At the bottom check Include ICC profile. Click Run.

Resizing and adjusting colour space

- In Lightroom
  - Develop the image as required
  - Use File/Export

Any questions about third party printing?

Printing Yourself

- Understand what is meant by colour
- Understand how our eyes are easily fooled
- Define colour in a technical way to avoid ambiguities of language
- Calibrate our equipment
  - Cameras
  - Screens
  - Printer / paper combinations
  - Use Photoshop to check

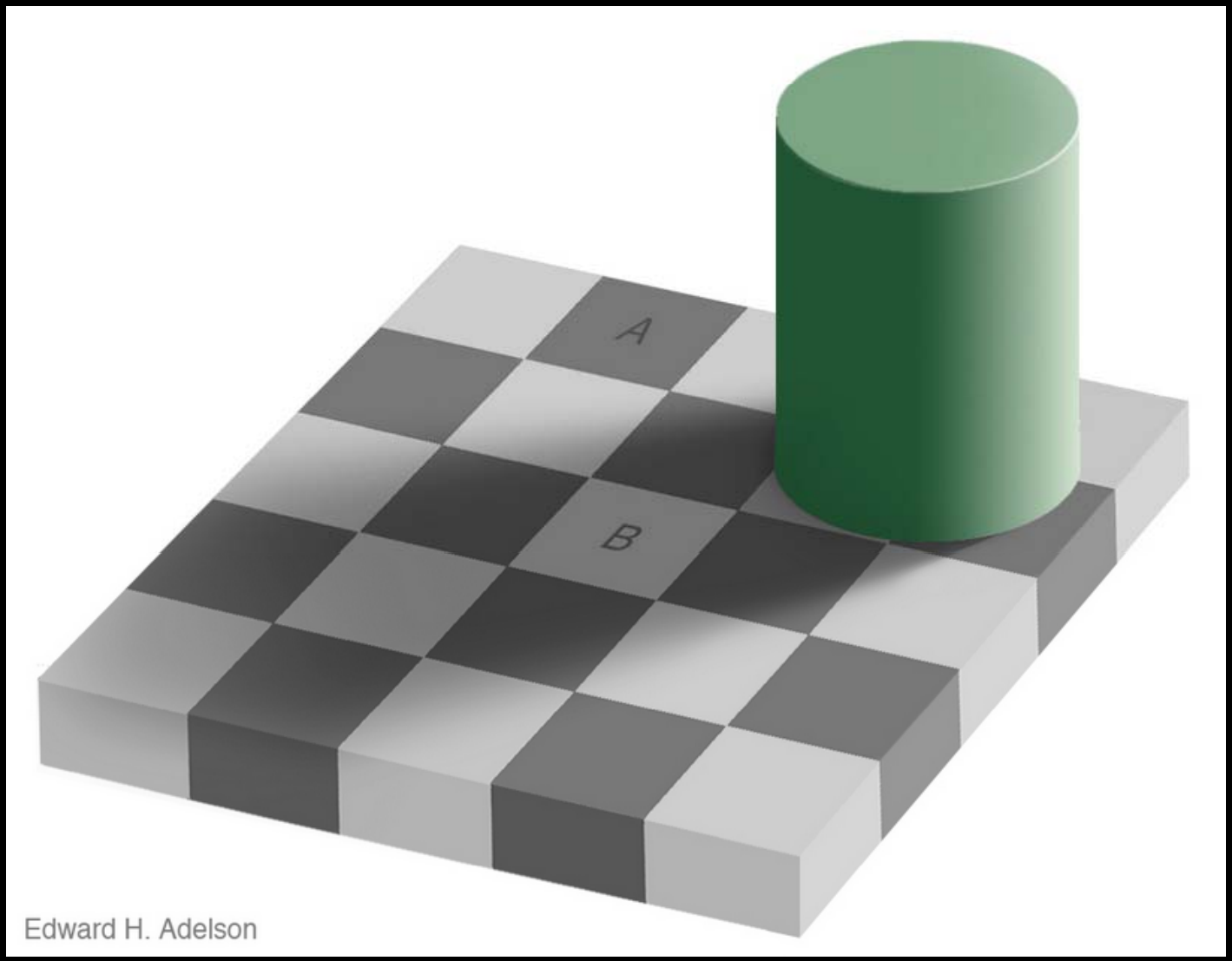
What is colour - 1?

- Colour has an everyday meaning and one or more technical definitions.
- There are 3 components to colour: hue, saturation and luminosity
- We can also talk about colours in terms of their Red, Green and Blue content {R, G, B}.
- The everyday meaning is a source of great confusion. What does it mean to ask the question “What colour is that flower, or worse still that paint?”
  - Violet, Lilac, Prudence, Fiddlesticks, Grand Poohbah – (all from the Dulux Colour Wall)

What is colour - 2?

- Colour is what we see with our eyes when an object is illuminated.
- The colour of an object depends on the source of illumination and the object itself.
- Colours LOOK different when you view them in sunlight, under fluorescent light, under sodium street lights and under “black” light at parties.
- Our eyes are EASILY fooled.

Our eyes easily fooled



What is the colour management problem?

- Every device in making colour images (cameras, scanners, monitors, printers) has a different response to colour.

- If you each took a photograph of a piece of red paper in the same lighting conditions, and then took it into Photoshop, and looked at the Info panel, you would find probably different values for the {R, G, B} values reported. They would be similar but most likely different.

- Conversely, if you made a coloured square using the Paint Bucket tool and then printed it to three different models of printer, without using colour management, you would find three different colours printed.

What is the solution?

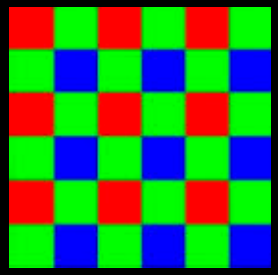
- Calibrate and profile each device
- Make use of colour management software
- A typical workflow is: shoot, display on monitor, edit, print.
- Each device: camera, monitor, printer has a profile.
- The profiles interconnect with a Profile Connection Space or Working Space

How our eyes see colour

- Human eyes contain colour sensitive cone cells.
- There are three variations of cone cell: Red sensitive, Green Sensitive and Blue sensitive.
- The extent to which light contains each of red, green and blue is the basis of colour vision.

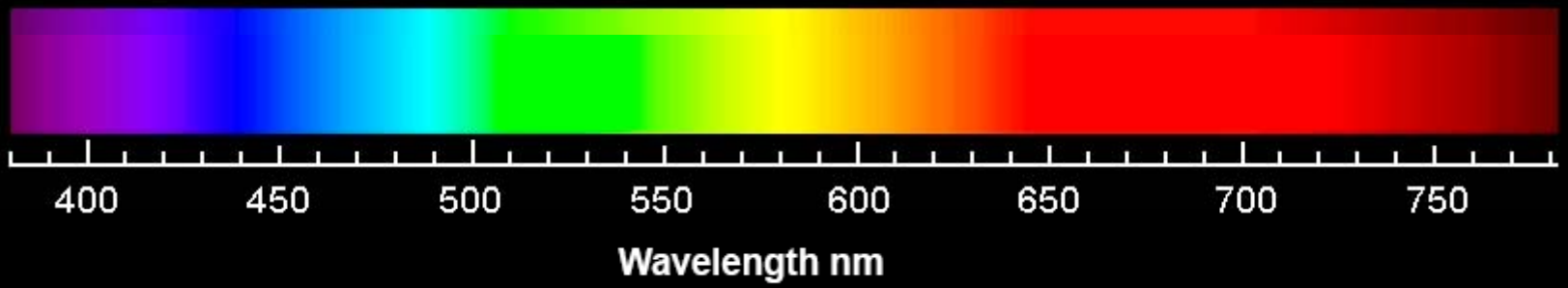
How our cameras see

- Most digital cameras contain a sensor which consists of photo-detectors covered by a filter that looks like this:



- This is representative of the human eye.
- The amount of light collected by each of the photo-detectors is compared with its neighbours and converted to a set of three numbers {R, G, B}
- This is called the RGB model.

Visible Spectrum



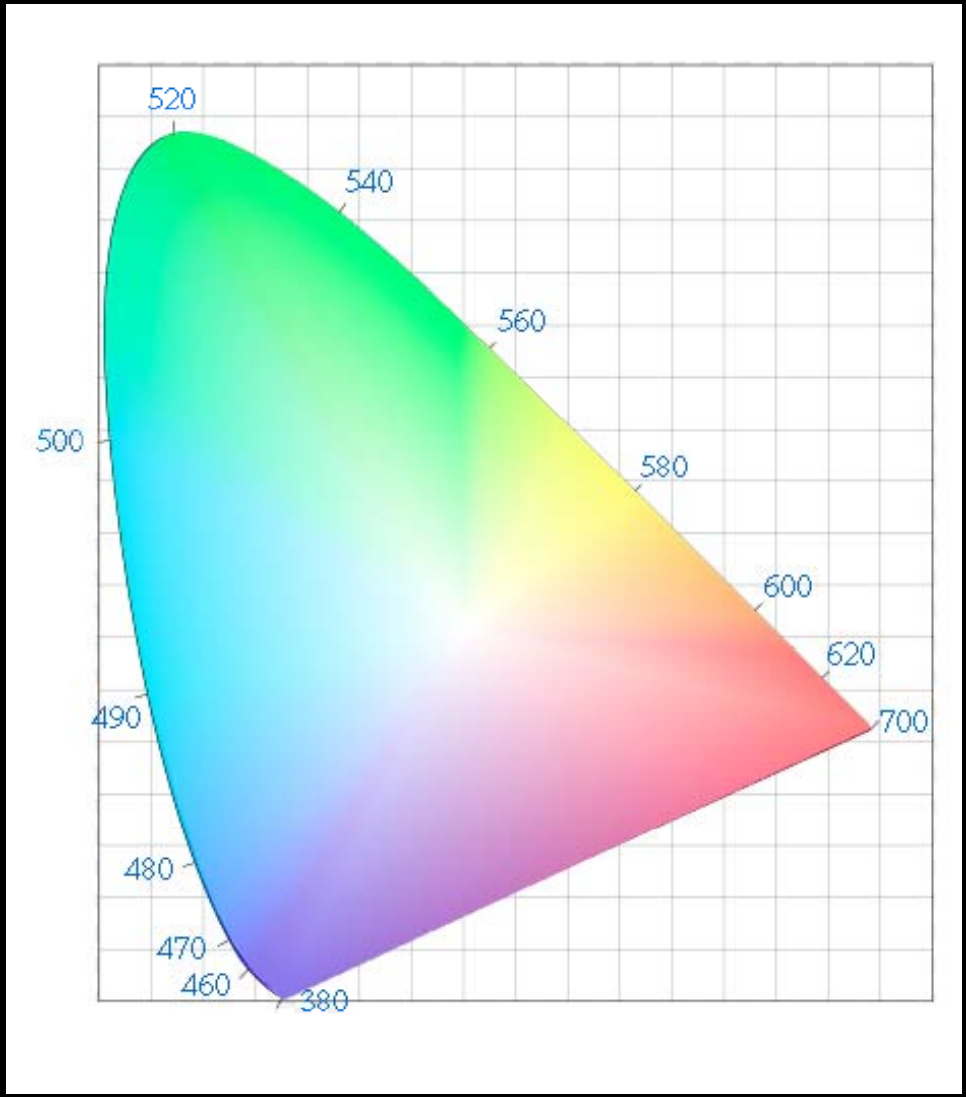
The visible spectrum consists of pure colours (hues).

Our eyes can perceive millions of other colours when the pure hues are mixed with each other and/or with white light.

The sum total of all of the colours our eyes can perceive is called the gamut of human vision

GAMUT means EXTENT

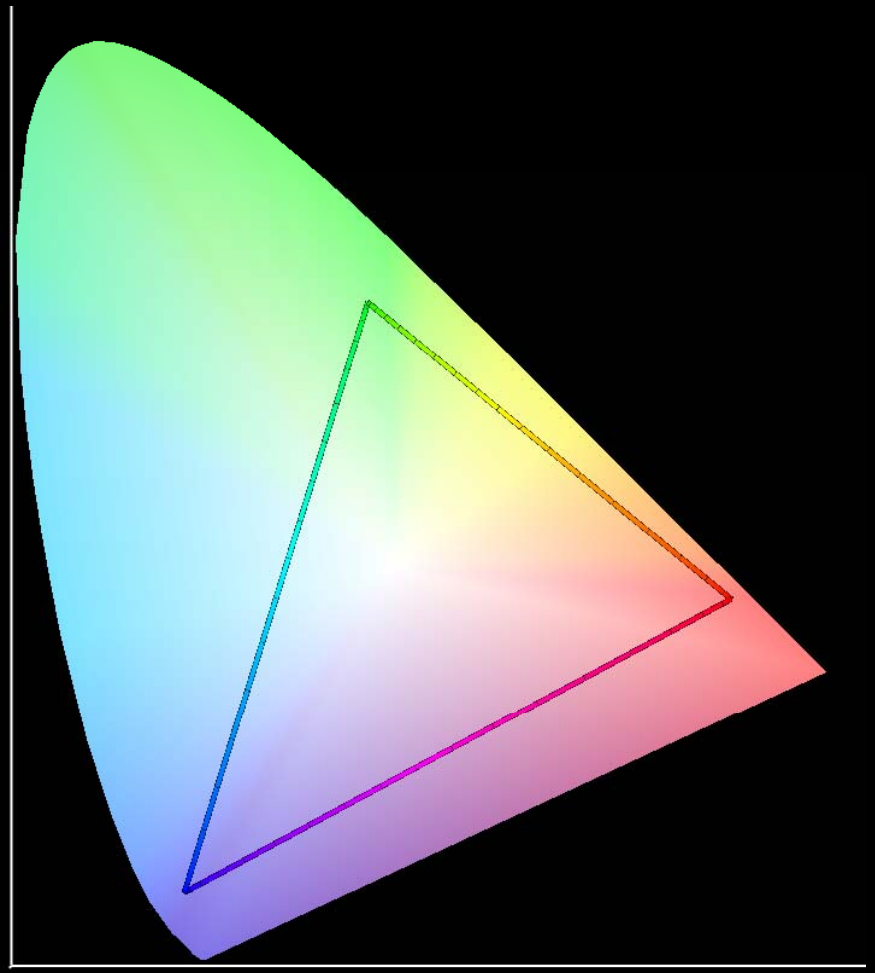
Gamut of the human eye



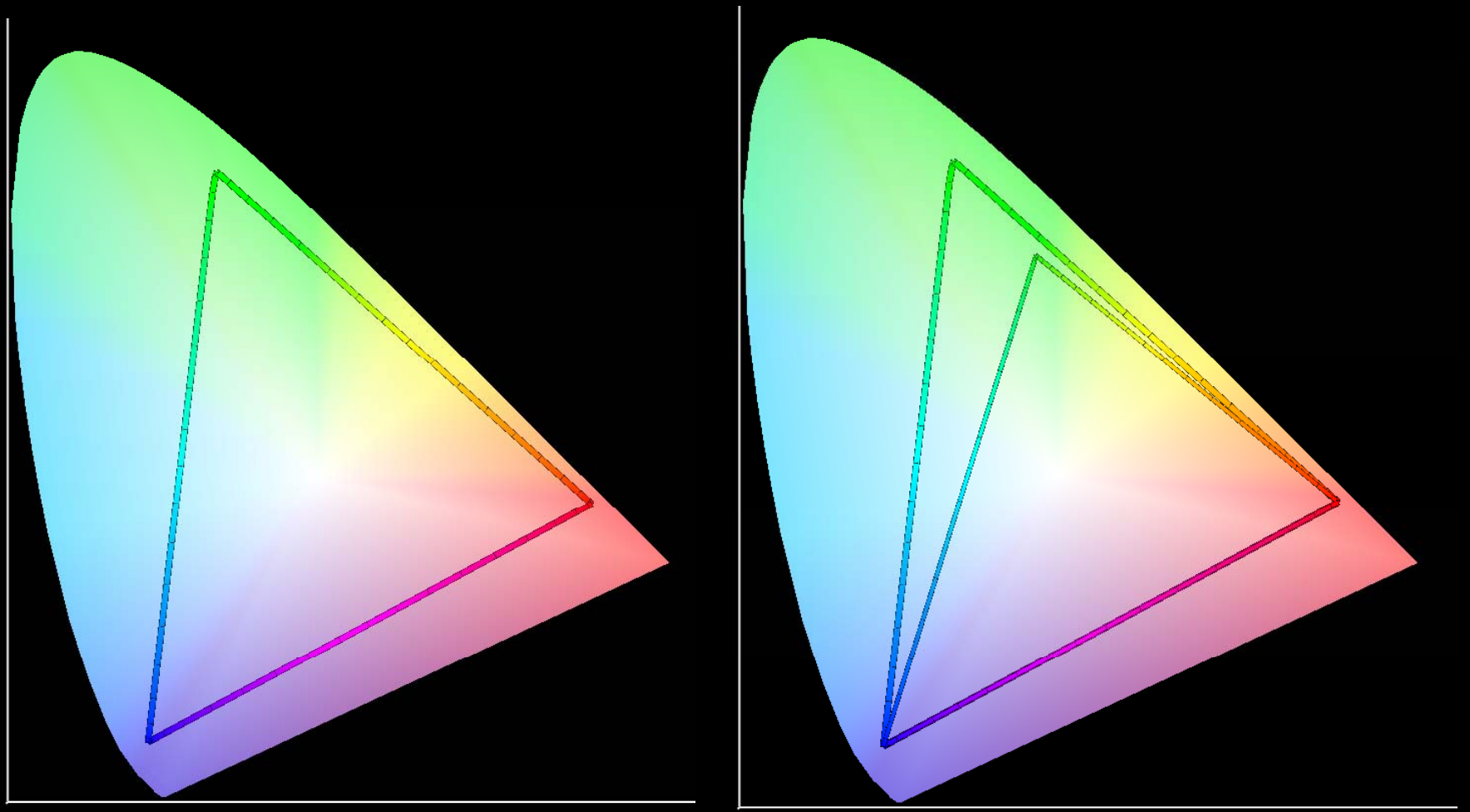
Colour space

- A colour space is a mathematical concept that lets us specify a range of colours in a colour model.
- There are three colour spaces of interest to photographers: sRGB, AdobeRGB, and ProPhotoRGB.
- If we plot colour spaces on the diagram that represents the gamut of the human eye we can gain an understanding

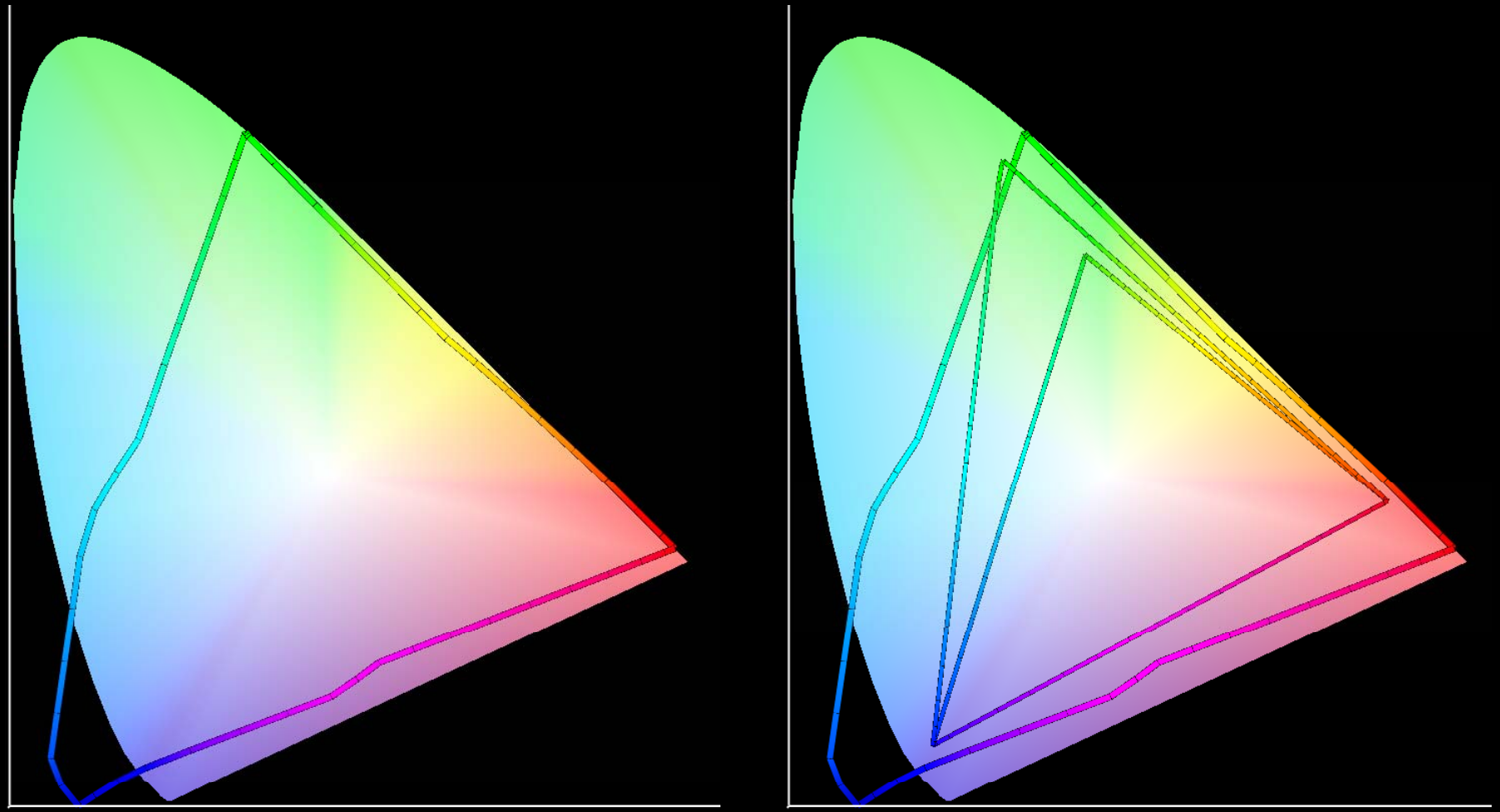
Colour Space - sRGB



Colour Space - AdobeRGB



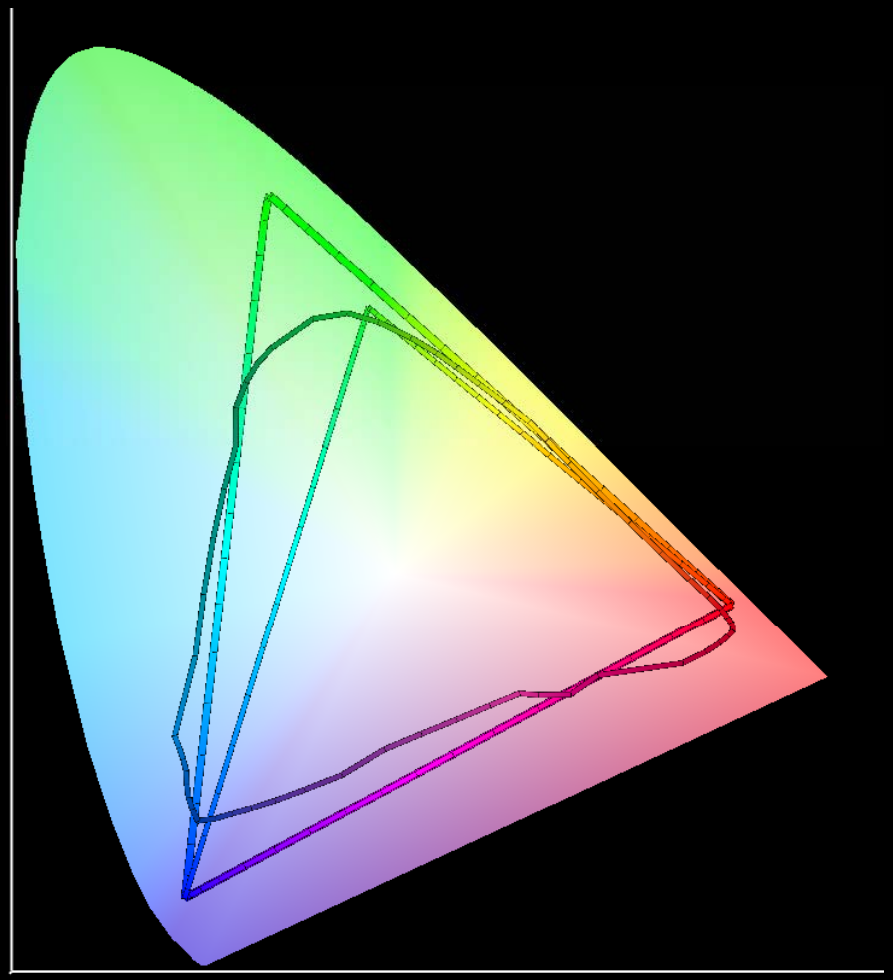
Colour space ProPhotoRGB



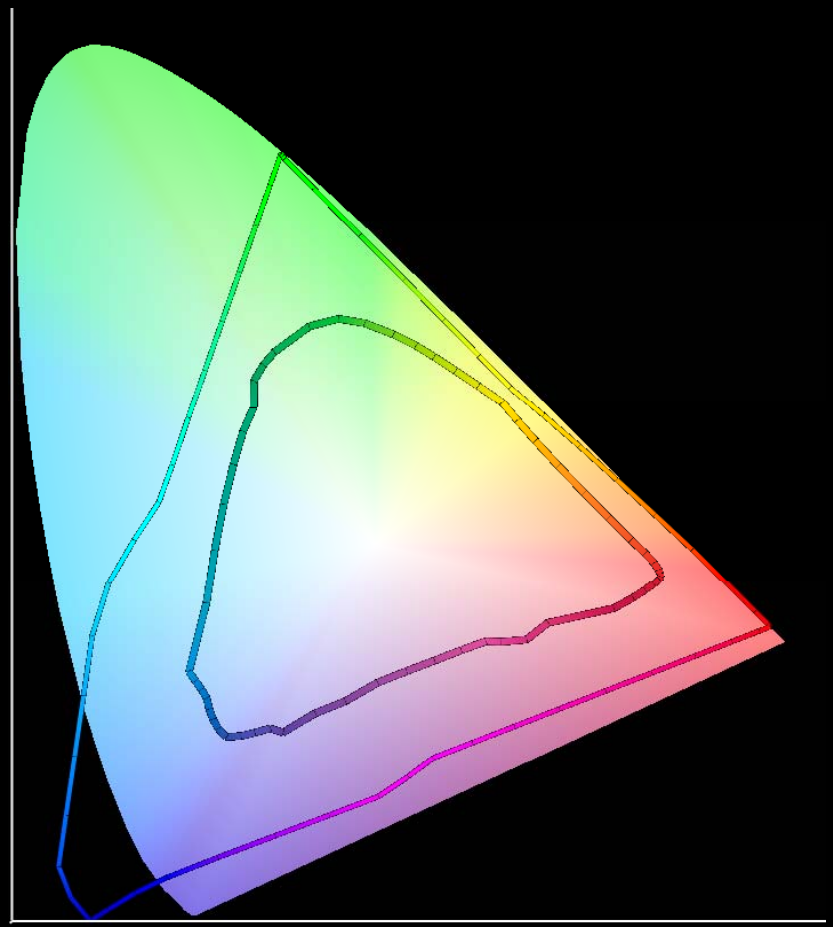
Why does colour space matter?

- Image editing programs have to work within a colour space: the bounds of the colour space (gamut) constrain the mathematics.
- Colour spaces are chosen on the basis of real world practicalities (the available technology)
  - Monitors are limited to sRGB or AdobeRGB
  - Printers are limited by their ink sets and the paper you choose
  - Commercial printing companies often choose the lowest common denominator (sRGB)

Colour Space Hahnemuhler PhotoRag

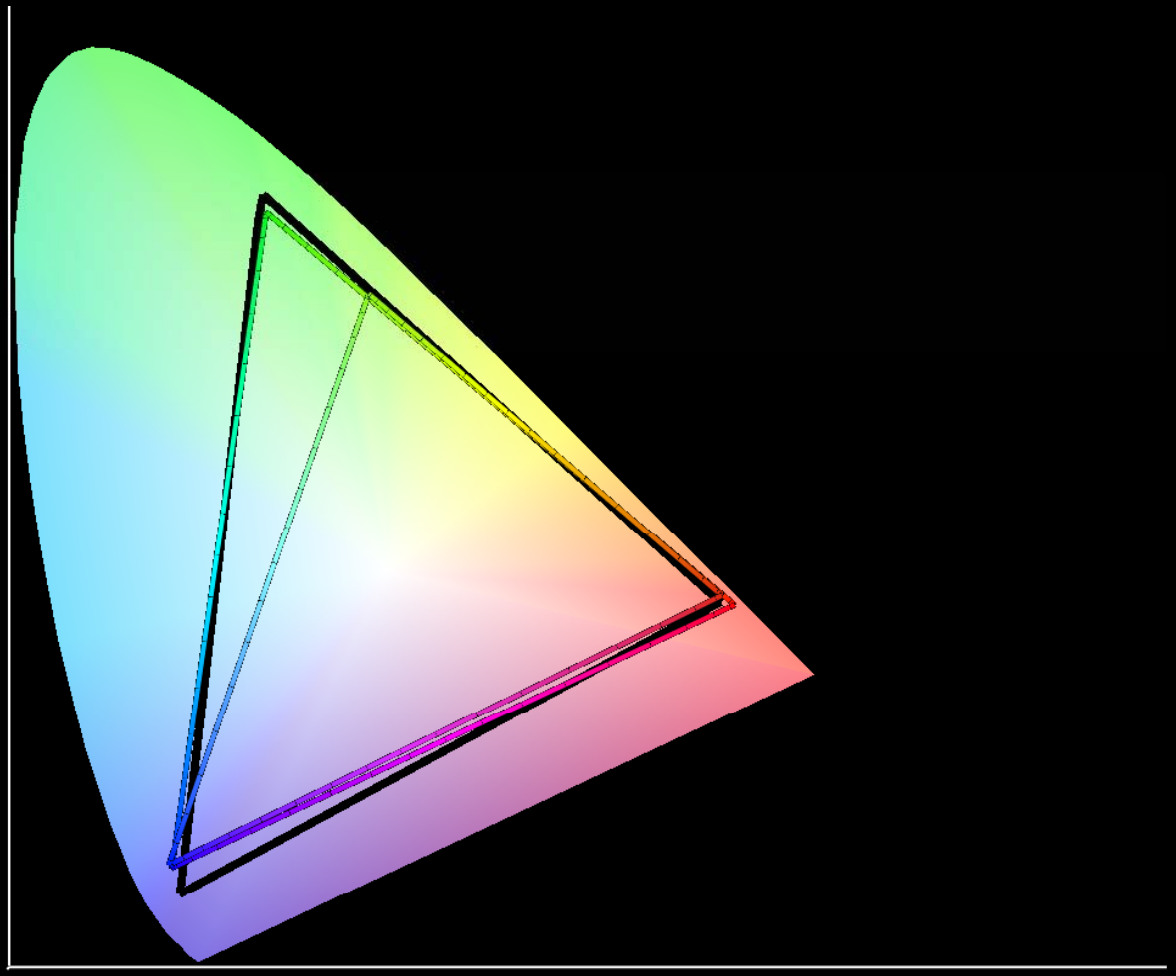


PhotoRag vs sRGB and Adobe RGB



PhotoRag vs ProPhoto RGB

Colour Space – 2 monitors



Any Questions?

Items to be Calibrated

- Cameras
  - Done behind the scenes by the camera (JPG images) or by Camera RAW (the RAW converter)
  - It is possible to fine tune camera profiles
- Scanners
- Monitors
- Printer / Paper combinations

ICC Profiles

- Device profiles are made for monitors, scanners and printers
- Device profiles work in conjunction with colour spaces (the Profile Connection Space) and the real world capabilities of devices
- Never forget that the best monitors can only just obtain the AdobeRGB colour space

Working colour space

- Lightroom uses ProPhotoRGB. This has become the *de facto* working standard.
- It therefore makes some sense to make this the default working space for Photoshop: BUT...
- When you upload an image for viewing by others you have to know what colour space they will use to view your image. At present that is likely to be sRGB

Where do you get profiles?

- Calibrate your monitor
- You may be able to download printer profiles from paper manufacturers
- Calibrate and profile your own printer

Printer Profiles

- Each printer / paper combination requires its own profile

Printer Profiling

- Is done in two stages:
  - CALIBRATION
  - PROFILING
- Calibration – the printer prints a test sheet and this is scanned by the ColorMunki. The data is used to determine how much ink to put down for a saturated colour.
- Profiling – the printer prints a second test sheet. The scan from this is used to create the ICC profile for the paper.

From digital image to print

- Choose your frame and mat size
- Choose a suitable paper to fit the mat
- Resize your image to fit the desired paper size
- Choose the printer resolution. This is very similar to preparing for third party printers but.....

Deciding on dot densisty

- For your own printer look at the specifications. You are looking for its native resolution.
  - Epson printers are typically 1440 dpi or 2880 dpi
  - Hewlett Packard printers are typically 1200 dpi
  - Canon printers are typically 2400 dpi
- Keep dividing the native resolution by 2 until you get within the 180 – 360 range
- For Epson printers you would get 180 or 360
- For HP and Canon printers you would get 300
- Why? Because when you send your image to the printer driver it will just have to multiply by 2 (or 4 or 8) to get to its native resolution. This will NOT degrade the image.

Making use of your profiles

- Lightroom and Photoshop have a sophisticated system for working with printer profiles - PROOFING
- All programs that use colour calibration require that you turn OFF printer colour management. This is easier said than done!
- A final complication is Rendering Intent

Rendering Intent

- Photographers should choose either “Perceptual” or “Relative Colorimetric”.
- Perceptual allows Photoshop to shift ALL colours away from the screen rendered view so that all the colours can fit into the printer / paper gamut.
- Relative Colorimetric tries to maintain accurate colours, but colours which are out of gamut get printed the same colour.

Lightroom

- Develop your image to your satisfaction
- Check soft-proofing and choose options in the dialog box
- Decide what to do about out of gamut colours: fix or choose perceptual rendering
- Go to the Print module
- Work your way through the dialog boxes – make sure you set the same options that you chose to proof the print
- Select your printer
- Go to the Printer/Properties dialog boxes
  - Choose your paper type and size
  - Choose your print quality
  - Make sure that “Printer Manages Color” is turned OFF.
  - Choose any other settings you want (such as Print Preview)
- Click OK

Photoshop

- Choose your working space.
- If working outside Lightroom, open the image and make sure that Camera RAW has the same colour settings as Photoshop.
- Make image adjustments in Camera RAW and/or Photoshop as required.
- Use the View/Proof Setup to choose the printer/paper profile
- Use Ctrl-Y to proof the print colours on your monitor (Assumes you monitor is calibrated)
- Use Ctrl-Shift-Y to look for out of gamut colours.
- If you have out of gamut colours:
  - Choose Perceptual Rendering Intent OR
  - Work on the image to eliminate or minimise out of gamut colours
- Choose File/Print
- Go through the dialog boxes similar to Lightroom

Finishing Prints

- Take care with the matting
- Handle ink jet surfaces with utmost care

Summary

- Make an effort to get the white balance correct at the time of shooting
- Decide whether to use a third party printer or DIY
- Resize your images for printing to the correct pixels/inch and the correct physical size.
- Profile your monitor and printer. Attempt to obtain a profile from third party printers.
- Soft proof your images to make the best decision about rendering intent.
- Make sure that the printer dialog boxes specify that Photoshop manages colours and that the printer driver's colour management option is OFF.
- Handle ink jet prints with care.

More Information

http://www.cambridgeincolour.com/color-management-printing.htm

http://www.northlight-images.co.uk/reviews/profiling/colormunki_printing.html

https://www.youtube.com/watch?v=R3a7mlfvItI

http://vimeo.com/13034916

Understanding Color Management: Abhay Sharmar

Real World Color Management: Bruce Fraser, Chris Murphy & Fred Bunting