INFO SHEET

TITLE: ADVANCING PHOTOSHOP / COURSE NOTES

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Advancing Photoshop Course

CONTENTS

Part 1

Working with Blending Modes

Blending Modes

One of the most powerful features of Abode Photoshop™ are its blending modes. Unfortunately not all blending modes are equally available throughout the program. For example the Add and Subtract modes are only available in Apply Image and Calculations. An understanding of Blending Modes is essential for advanced digital image editing processes. Of the 29 possible blending modes, the twelve most useful modes for digital photographic editing are indicated∗ below:

Brushes Blending Modes

Layers Blending Modes

Calculations Blending Modes

Healing Brush Blending Modes
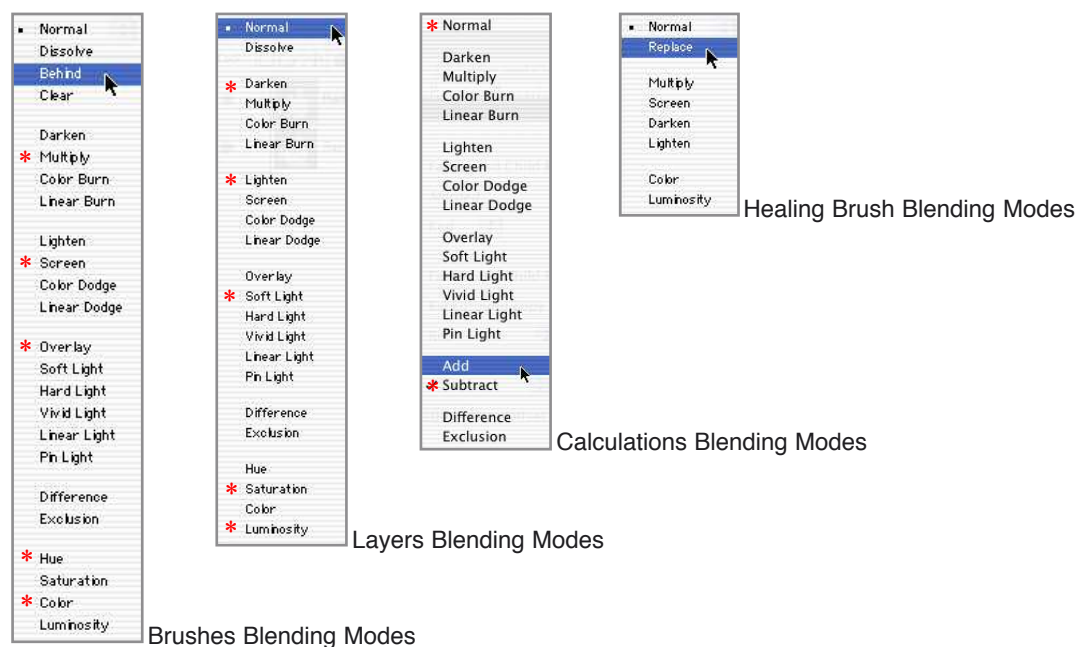
Normal

=

Elements are simply overlaid without replacement. This mode is used for compositing with variable opacity and layer styles.

Lighten

=

Lighter pixels will replace overlapped darker pixels. Often used in retouching dark spots and artifacts in images.

Difference

=

Difference reveals any difference between overlapped pixels. Often used to accurately align different versions of the same or different images.
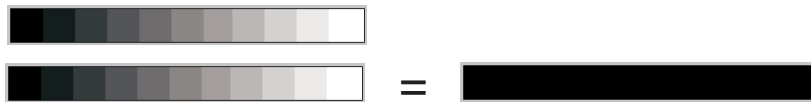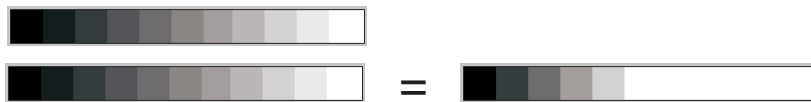
Darken

Darker pixels will replace overlapped lighter pixels. Often used in retouching light toned artifacts such as dust on scanned negatives.
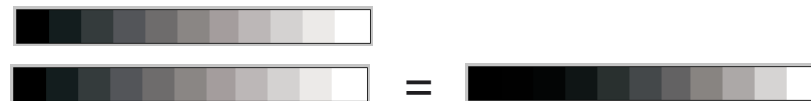
Subtract

Subtracts the overlapping pixel values without any constraint. It usually results in darker images, and is useful in combining low contrast masks with images.

Add

Simply adds the overlapping pixel values together without any constraint. It usually results in lighter images and is useful in combining masks with images.

Multiply

Overlapping pixel values are multiplied together (and then divided by the maximum density range of the images). This mode intensifies the image without blowing out highlights, and is often used for correcting over exposed images and reinforcing highlight detail.

Screen

Overlapping pixel values are added together (and then divided by the maximum density range of the images). This mode lightens the image without blowing out the highlights, and is often used in combining masks, and correcting under exposed images.

Overlay
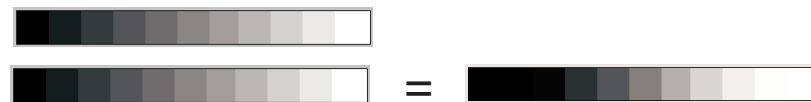
Dark areas are multiplied and light areas are screened. Areas of 50% grey produce no change between the overlapping pixels.

Softlight

This is a less abrupt version of Overlay mode, particular in the shadows. Areas of 50% grey produce no change.

Hue, Saturation, Color and Luminosity Blending Modes

Hue combines the basic colour, or Hue of the active layer, with the Saturation and Brightness or Luminosity of the underlying layer.

Saturation combines the Saturation or vividness of the active layer, with the Hue and Brightness of the underlying layer.

Colour combines the Hue and Saturation of the active layer, with the Brightness of the underlying layer.

Luminosity combines the Brightness of the active layer, with the Hue and Saturation of the underlying layer. For example:

Original Colour & Brightness

'Apply Image' the Green Channel to a new layer and Blend on Luminosity

Original Colour + Green Luminosity

The Hue, Saturation, Color and Luminosity blending modes can be used with Adjustment Layers to limit image corrections to the desired effects, without masks or selections.

| Blending Mode:	Edits:	Preserves:	Minimises:
Hue	Hue	Luminosity	
Saturation	Saturation		Brightness
Colour	Hue and Saturation		
Luminosity	Brightness and Saturation	Hue	

The Hue, Saturation or Colour (Hue + Saturation) blending modes can also be used with advanced 'masking techniques' to further refine colour and density corrections.
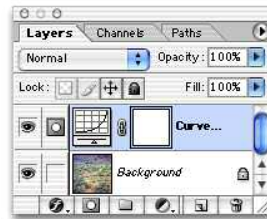
Blending Adjustment Layers

Many of 'Photoshop > Image > Adjustments' can be loaded as Adjustment Layers. This allows incremental adjustments to be made with a reduced risk of incremental posterization. When the image is then flattened, archived or printed, only one adjustment per adjustment layer is applied. Blending Adjustment Layers with different Blending Modes further refines this technique by constraining the adjustments to desired values.
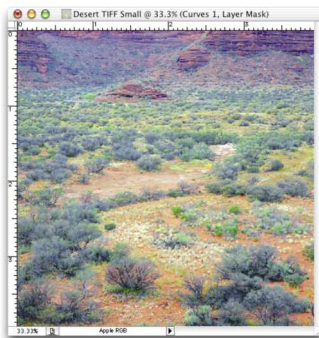
Original Image © Glenn Guy

Adjustment Curve RGB

Adding a Curves Adjustment Layer Blended on Normal (default setting).
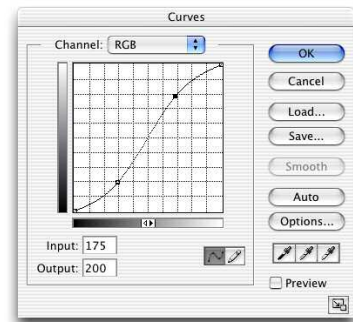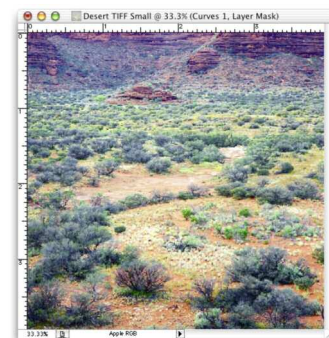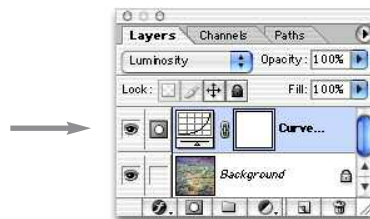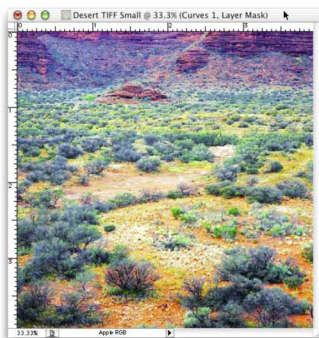
This results in the image Colour (Hue and Saturation) as well as Luminosity all being affected. But when the Adjustment Layer is Blended on Luminosity the Hue remains unchanged and only the Luminosity (Brightness & Saturation) is altered.
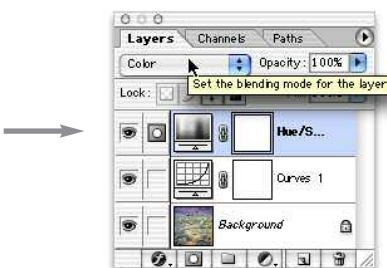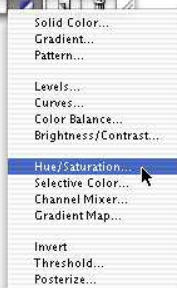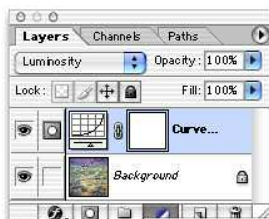
Adding a HSL Adjustment Layer Blended on Colour allows the Saturaiton (& Brightness) to be simultaneously increased or decreased without effecting the Hue. This does not preserve the Luminosity, rather it provides brighter *and* more saturated colours. Conversely blending on Normal preserves the Luminosity (Brightness & Saturation) of the image when the Hue is altered.
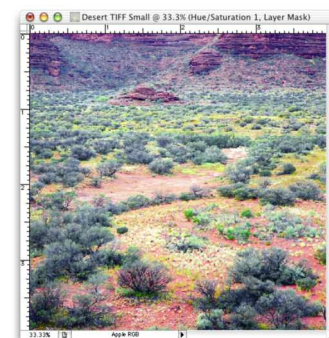
Intensification and Reduction

Chemical intensification and reduction are important photographic processes that were originally used to custom post-process the density and contrast of negatives for specific printing processes. They were also used as sophisticated print enhancement tools. Similar digital processes are available and can be used to correct digital camera exposures or globally and/or locally enhance print luminosity. For example underexposed images can be Proportionally Reduced (brightened) or overexposed images can be Intensified. Images can also be (globally or locally) Subtractively Reduced with often stunning pictorial effects.

Intensification: (Darken and increase contrast)
Blend duplicate image layer on Multiply.

Original Image   + 1 Multiplied Layer   + 2 Multiplied Layers

Proportional Reduction: (Brighten without obvious contrast increase)
Blend duplicate image layer on Screen.

Original Image   + 1 Screened Layer   + 2 Screened Layers
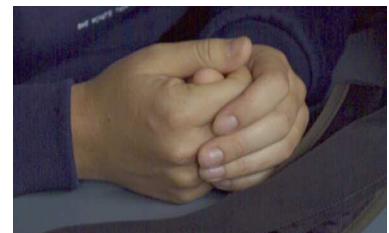
Subtractive Reduction & Intensification: (Increase contrast)
Blend duplicate image layer on Overlay and adjust Layer Opacity to control contrast.

Original Image   + 50% Overlay Layer   + 100% Overlay Layer

Combining Blending Modes

By combining several duplicated image layers with gradient layer masks and different blending modes is an excellent method of quickly obtaining dramatic improvements in the rendering of an image. For example, locally constraining (masking) the exposure compensation (brighten without contrast increase) effects of a Screened image layer with the density and contrast increasing effects of Multiply and Overlay image layers.

Original Image

Overlay + Layer Mask

Multiply + Layer Mask

Screened + Layer Mask
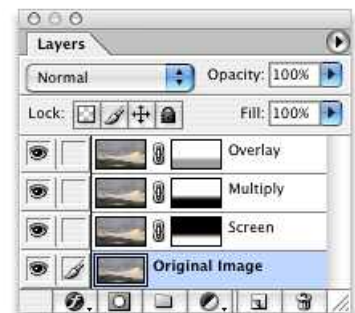
Blended Image

The Layer Opacity can be adjusted and/or gradient Layer Masks locally retouched and/or additonal blended image layers added as required to refine the overall pictorial synthesis.

Altered Luminosity Blending

Combining an altered Luminosity can dramatically improve the rendering of some objects without destroying the overall colour balance. For example Luminosity Blending the Green channel or a combination of the Green and Blue channels into the original image can add a subtle but compelling 3D appearance to skin tones and facial expressions.

© Fi Mims Photography

Plus Green/Blue Channel Luminosity

Multiply Blending

The image is duplicated, desaturated and Color Balance to s sepia rendering, and its contrast is reduced before being Multiply blended into the original image via a Layer Mask.

Multiply Blending simply multiplies the RGB numbers for each pixel in both layers then divides the result by 255. The effect is to significantly increase contrast while progressively adding the characteristics of the top layer to the original background image.
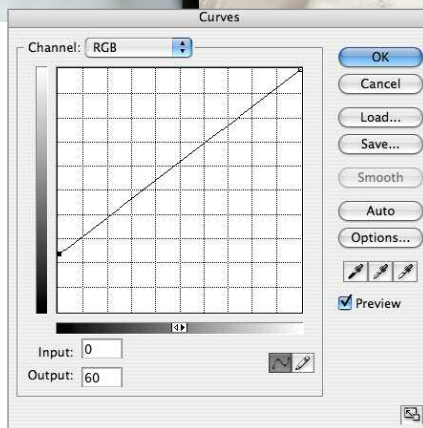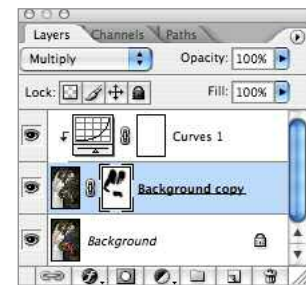
Reducing the contrast of the blended layer reduces the multiply effect in the shadows. An Adjustment Layer efficiently controls this effect, while a Layer Mask locally redistributes it into the image.

© Fi Mims Photography

Part 2

Advanced Masking

Highlight Protection Masks - Layer Styles Masking

Highlight Protection Masks will preserve the original highlight values while other areas of the image are being edited, or they can be used for the local correction of highlight colour casts, acutance and contrast.

1. Duplicate the original image layer and place it at the top of the layer stack.

2. Use Layer Styles to constrain this layer to just the highlights that need to be 'protected' or preserved.

3. Option Dragging the individual shadow sliders apart will feather the mask's integration with underlying layers.

4. Any adjustment layers between the original image layer and the mask will only be seen to effect the image values not covered by the highlight protection mask.
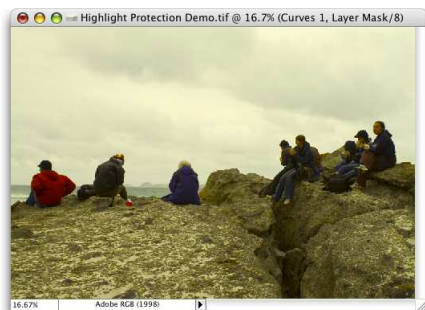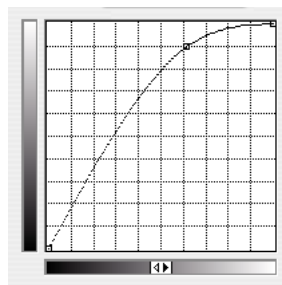
Original Image
    Adjustment Curve
    Corrected Landscape
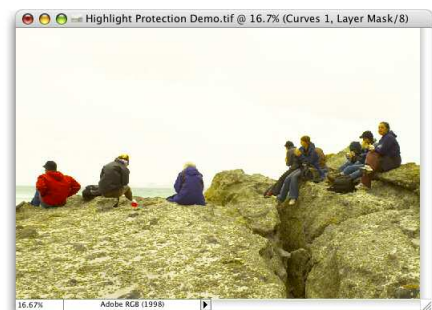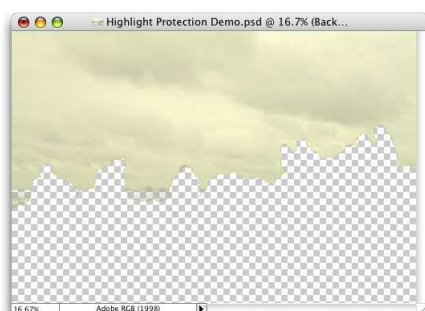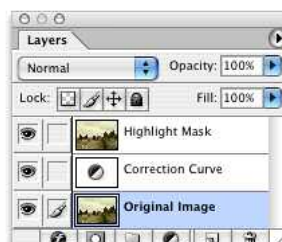
Highlight Protection Mask
    Layers
    Final Composite Image

Notes

A highlight protection mask blended on Normal will protect highlight tonality while facilitating the correction of any highlight (or shadow) colour casts.

A desaturated highlight protection mask, or blending on Luminosity, will 'neutralise' the protected values without effecting the colour balance of the rest of the image.

Notes on Layer Style Blend If Options

Layer Style Blending Options include layer Blending Modes, Layer Opacity, Advanced Blending and Blend If options. The Blend If option allows discrete luminosity ranges of each layer to be blended together as follows:

Invisible in top layer

Visible in bottom layer

Visible in top layer

Invisible in top layer

Visible in bottom layer

Partially visible in bottom layer

Invisible in bottom layer
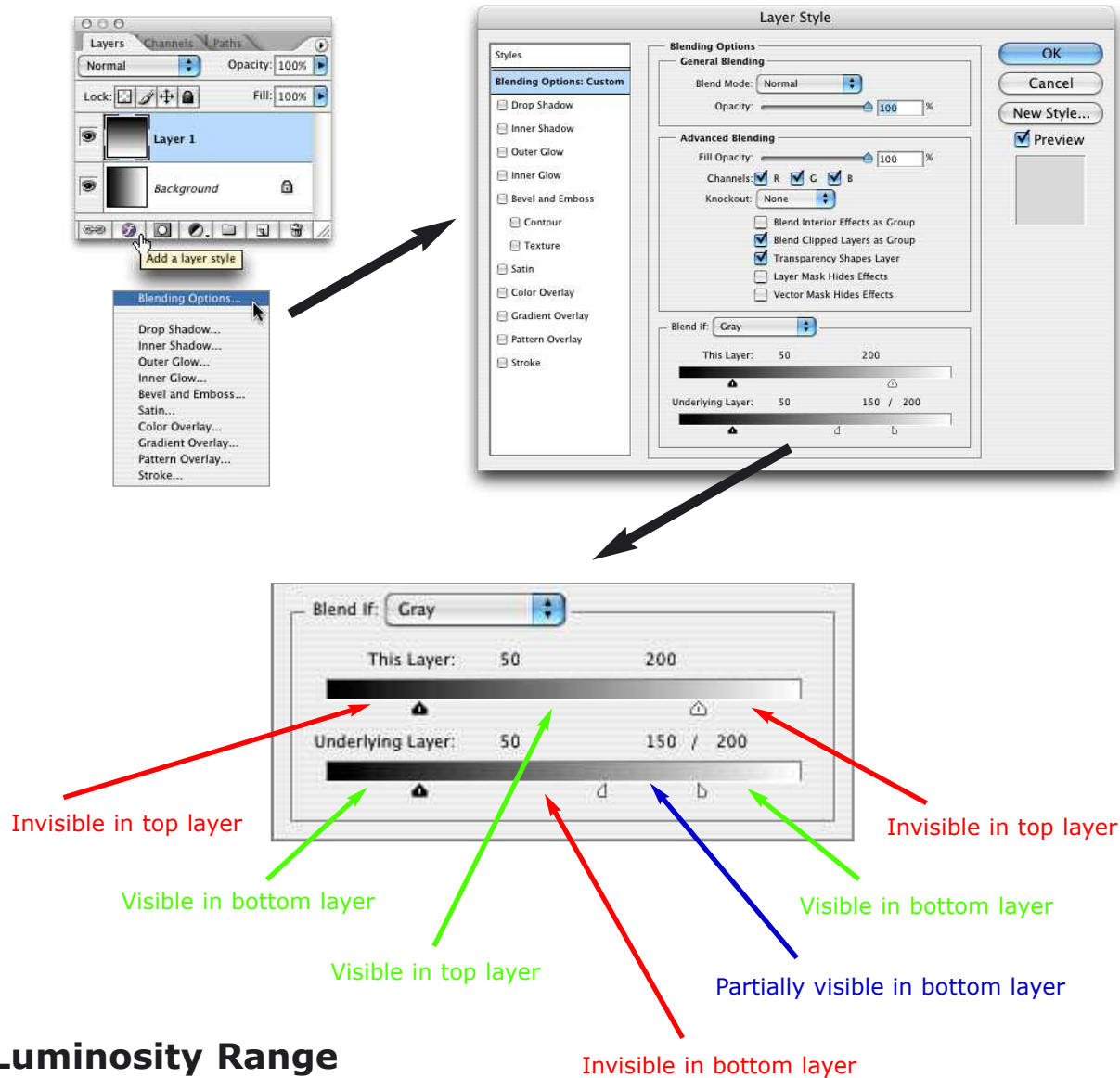
Luminosity Range

Numerical readouts provide precise control over the luminosity ranges being blended. Holding down the Option/Alt Key will allow the component sliders to be dragged apart which feathers the transition from 100% visible to 0% visible. The Underlying Blend If Layer functions as the mirror opposite of the top Layer. Blending two B&W or colour gradients together will reveal how these Blend If options work. Typical applications include restricting sharpening to mid tones only ie. not the shadows (noise) or highlights (detail).

Equalisation Masks - Unsharp Overlay Masking

This technique can produce a significant increase in apparent image 'luminosity' or 'presence'. It often appears as if the image has been turned into a mirror that reflects or radiates light, making the image 'glow' irrespective of its subject matter.

1. Colour correct and duplicate the original image layer twice.
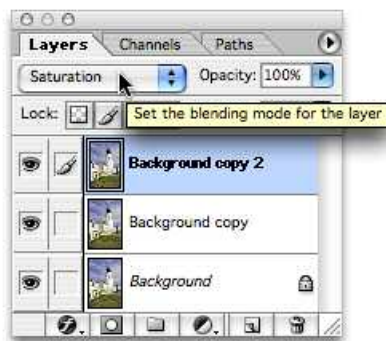
2. Blend the top ('Protection') layer on Saturation Mode and the middle layer on Overlay.
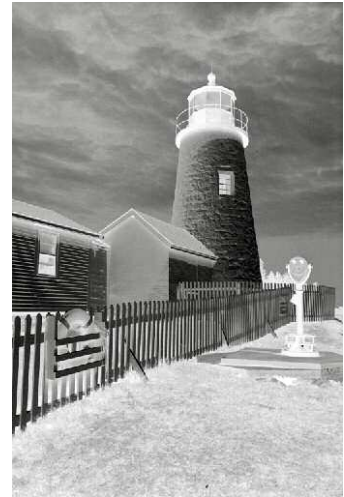
3. Invert and desaturate the middle layer.

4. Apply a heavy Gaussian Blur at approximately 20% of the image's pixel dimension.
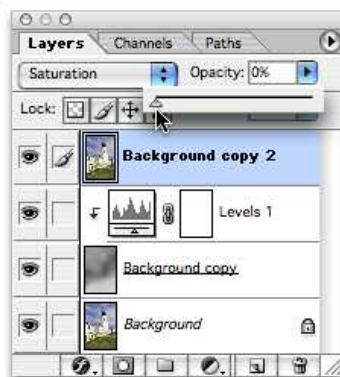
5. Use Levels grouped on the Blurred Overlay Layer to control image brightness.

6. Adjust the opacity of the Saturation Layer or Blend on Hue to control saturation.

This example mimics the silver masking techniques (and dodging & burning) that were routinely applied in the traditional silver gelatin fine print darkroom. The aim is to make the objects in the image brighter than the light sources they are reflecting. In this example, the foreground becomes brighter and more luminous than the sky (it is reflecting).

Equalisation Masking Variations

1. Alternatively blend the top Protection Layer on Normal or Hue rather than Saturation for images that would benefit from the increased saturation effect.

2. Apply the Gaussian Blur at approximately 20% of the image's pixel dimension. For example apply a 200 pixel radius Gaussian Blur to a 1000 pixel wide image. For high resolution images you may need to apply the Gaussian Blur filter more than once at its maximum setting (250 pixel radius) in order to produce a sufficiently diffused mask to hide local transitions in the finished image.

3. 'Dodge & Burn' the blurred Overlay Blurred Layer for local effects or corrections.

Notes

The Overlay blending mode has no effect on 50% grey areas in the inverted mask, but Screens lighter areas and Multiplies darker areas. This means that the image's shadows (represented as < 50% grey in the inverted mask) are lightened and intensified (Screened) while the image's highlights (represented as > 50% grey in the inverted mask) are darkened and intensified (Multiplied).

The top layer blended in Saturation Mode acts as a Saturation Protection Layer. This ensures that the Overlay Blurred Mask does not excessively change the saturation of the image.

Alternatively the Saturation Protection Layer can be turned off, or blended on Normal or Hue, or its opacity lowered. Changing the opacity of the Saturation Protection Layer adds a simple custom saturation control tool to the layer stack that provides a controlled increase in the image's colourfulness.

This procedure can be captured as a Photoshop Action and automatically applied to other images. Stops will need to be added to the action to control the amount of Gaussian Blur and Levels luminosity adjustment as required.

In general, increased blur produces less artifacts or mask misalignment in the finished image.

Luminosity Masking

It is often not possible to apply all required changes to an image with a single Photoshop curve. Adjustments to one area of the image may change similar values in another area that actually require a different rendering. For example, the shadows and mid tones in a landscape may need to be rendered with increased local contrast and lighter than the sky.
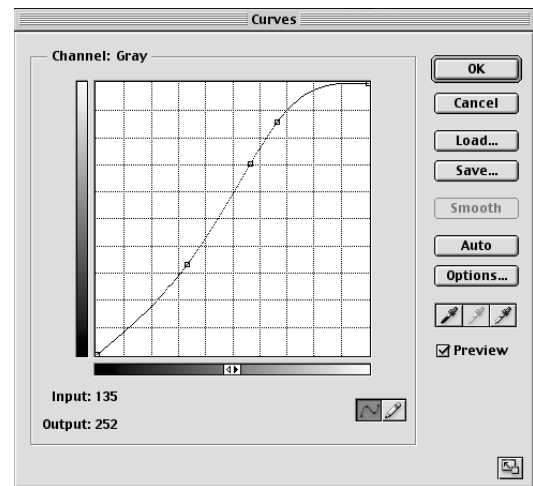
On the other hand the sky may need to be darkened and lowered in contrast.
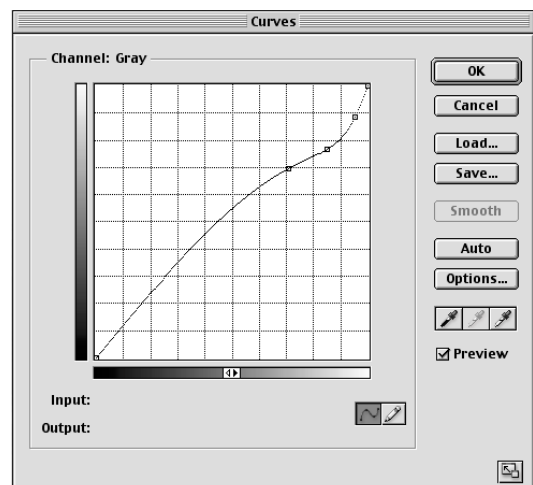
This conflict can be resolved by blending duplicate versions of the same image that (as in the above example) have each been rendered independently of one another. However the question remains as to the best way to blend these different versions of the same image.

Luminosity Selection

A Luminosity Layer Mask is a simple and efficient method of accurately blending the two image layers together. A Luminosity Mask is based on the photographic image's optical resolution, therefore detail as fine as exists in the image itself will be accurately masked. Create a **Luminosity Selection** by Loading a Channel as a Selection.
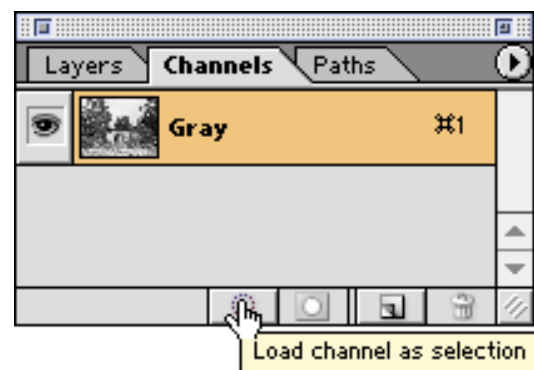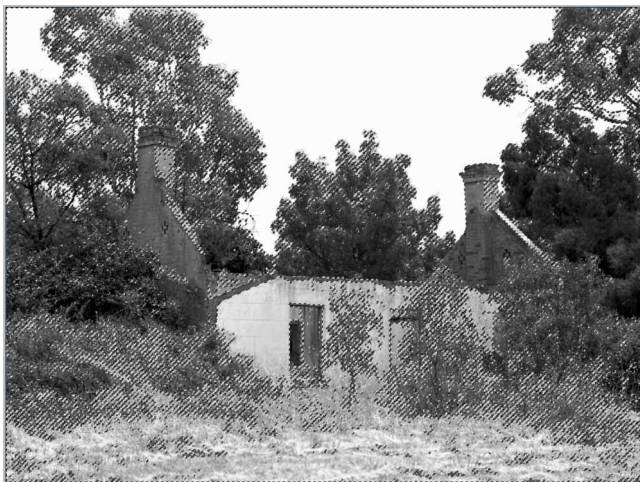
Choose the image channel that shows the greatest tonal separation between the pictorial elements that will be blended in the final composite. For example between the sky and the trees. The keyboard shortcut to create a luminosity selection is to (Mac) **Command Click** (PC: Control Click) on the channel. Note: In the above example the image is in greyscale mode and therefore has only the one image channel.

Adding a Layer Mask will auto load the active (luminosity) selection as the Layer Mask.
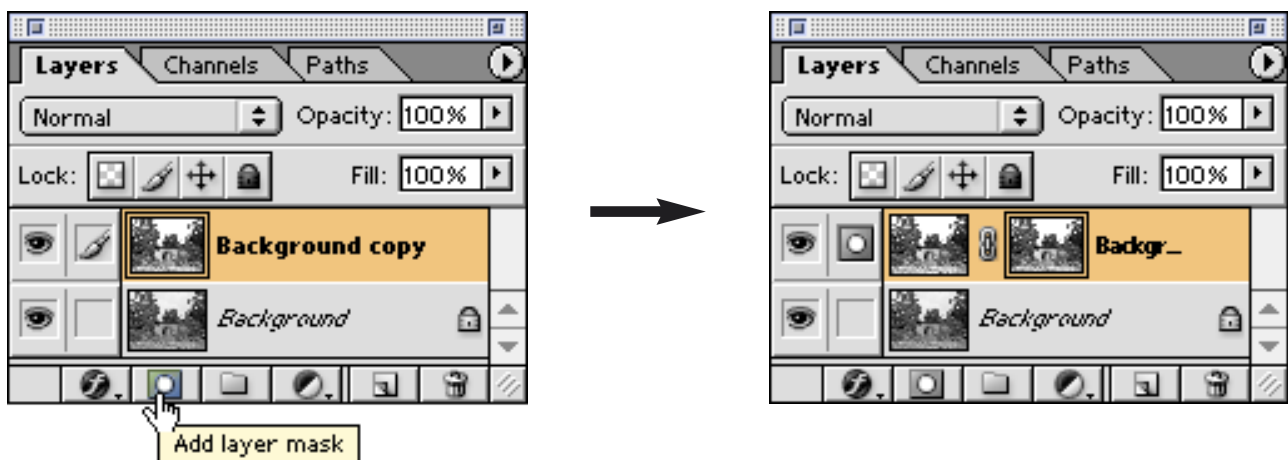
Adjusting the Layer Mask

Adjust the Layer Mask's contrast to further isolate the pictorial elements (sky and trees).
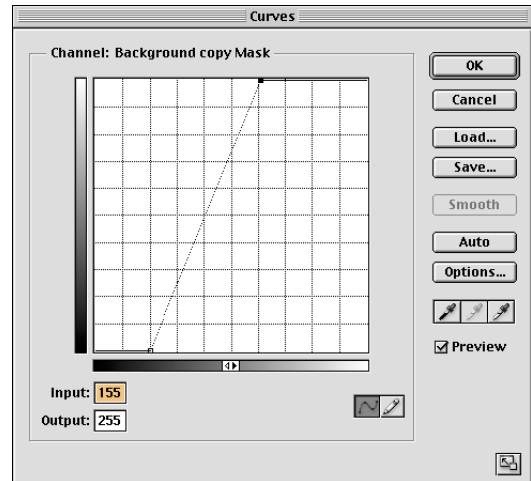
White in a layer mask renders that masked area visible, and black renders that masked area invisible in the image composite. In this example the Layer Mask needs to be inverted into a 'negative' to render the sky black and therefore allow the lower contrast sky in the bottom layer to remain visible in the final composite.
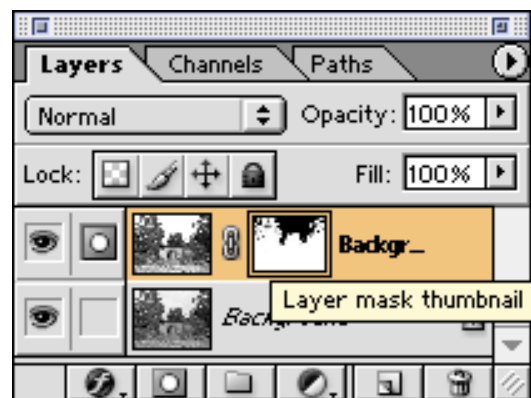
Note: Option-Click on the Layer Mask thumbnail to show the Layer Mask on screen.

The Layer Mask can be retouched with white or black paint to locally refine the areas that will be composited together. In this example the Layer Mask's 'highlights' on the fore ground buildings and foliage have been painted over with white paint to ensure their luminosity in that layer is preserved in the final composited image.

Final Composite Image

Adjustment Layers (curves, levels, etc) can be added to either layer to further refine the blending and/or rendering of the composited layers.
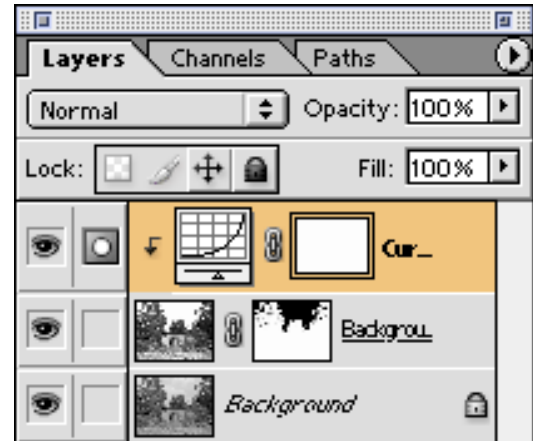
An enlargement reveals the 'photographic' accuracy with which the Luminosity Layer Mask blends the low contrast sky of the bottom layer with the higher local contrast landscape of the upper layer.

Composite without Luminosity Layer Mask.

Composite with Luminosity Layer Mask.

Summary

Luminosity Layer Masks blend duplicated layers together with the accuracy of the optical resolution of the photographic image itself. This accuracy can not be achieved with Photoshop Paths or Photoshop's traditional selection tools such as the Magic Wand.

RGB Luminosity Masking

Often a figure can be separated from its background based on colour difference. In this example the cyan-blue sky can be selected and desaturated without overly effecting the yellow car. However anywhere the sky reflects in the car's duco will also be desaturated. This might require local retouching on a Layer Mask to preserve the reflections in car.

© Jun Sawa

The HSL Adjustment Layer automatically 'selects' areas of the image based on colour. Using the HSL Eye Dropper the sky can be clicked on to further refine the colour selection. The Layer Mask can then be retouched to hide (black) or reveal (white) the effect.

Add HSL
Desaturated
Adjustment
Layer
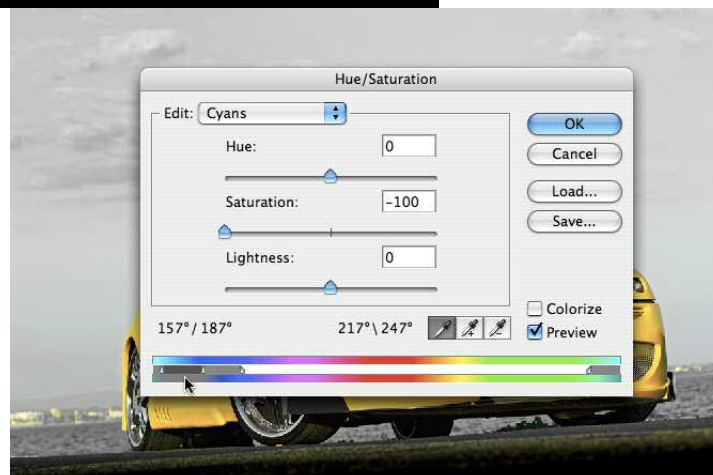
Add Blue
Channel
Layer
Mask

If one channel clearly separates the background and foreground elements (in this case the Blue Channel) then that channel can be loaded as a Luminosity selection (Cmd click on the channel) which will be automatically loaded as a Luminosity Mask when an Adjustment Layer is added.
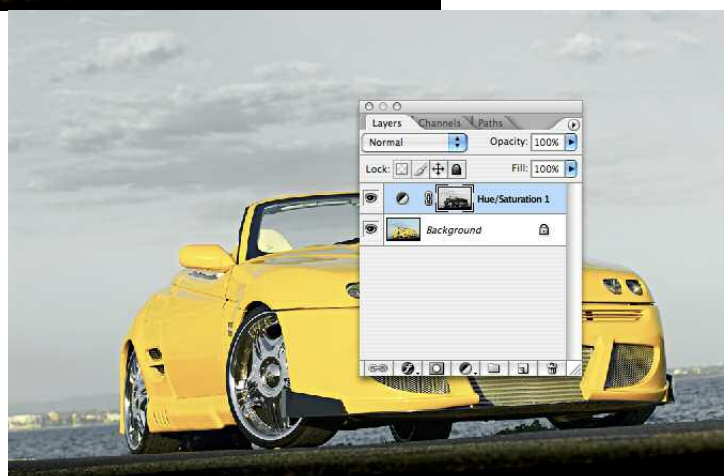
Advanced Luminosity Masks

A Luminosity Mask can also be made from any of the 11 available channels (RGB, R, G, B, C, M, Y, K, L, a, b) in Photohsop. Duplicate the image and Mode change to the desired colour model. Create the luminosity selection and save it to the original image, load the selection and add a layer mask. Note that a Luminosity Mask made from the RGB channel is not identical to a Luminosity Mask make from Photoshop's default Greyscale channel. Photoshop's Channel Mixer can also be used to create a custom greyscale rendering for the purpose of custom Luminosity Masking. The main options are illustrated below.

RGB

RGB (Red Channel)

RGB (Green Channel)

RGB (Blue Channel)

CMYK (Cyan Channel)

CMYK (Magenta Channel)

CMYK (Yellow Channel)

CMYK (Black Channel)

Lab (L Channel)

Lab (a Channel)

Lab (b Channel)

Custom (Grey Channel)

A grouped Adjustment Layer can then be used to precisely control image values within the masked areas of the image. The combination of Hue, Saturation, Colour or Luminosity blended editing constrained to a selected (masked) range of image values is an extremely flexible and powerful editing tool. Practical applications of this technique would include reducing cyan skin tone shadows, or neutralising excessively blue landscape shadows, or colour correcting water reflections, while not effecting any other area of the image.

Grey Component Luminosity Editing

The black slider in Selective Color is equivalent to altering the Grey Component Replacement (GCR) in a CMYK printer profile. Reducing the black component increases the translucency of that colour, while increasing the black intensifies the texture or modeling of that colour. Selective luminosity masking refines the image's spatial composition.

Original Image © Jim McFarlane

With Global Selective Color Corrections

With Selective Color Corrections plus Layer Mask
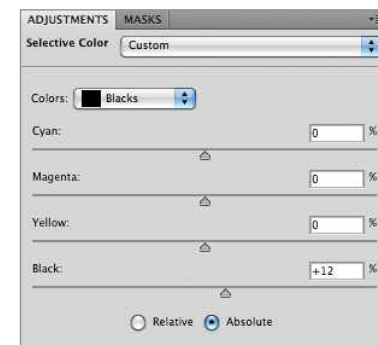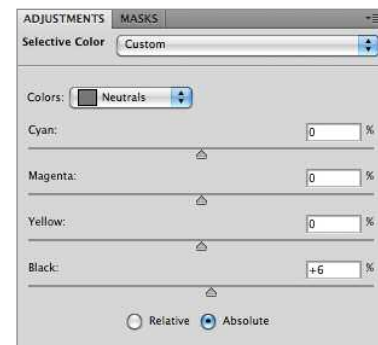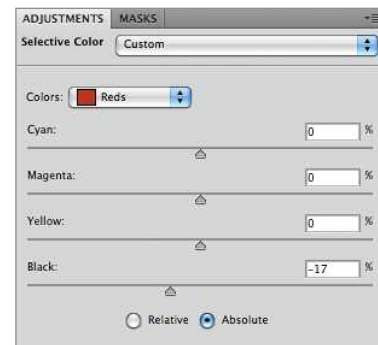
Selective Color Corrections

Colour Mode Luminosity Masks - Equalising Skin Colour

Often portraits, even when taken under controlled conditions in a studio, will exhibit local and disturbing variations in skin colour. By combining luminosity selections with colorization and colour mode masking, aberrant skin colours can be automatically replaced with corrected values. For example:

1. Open image.
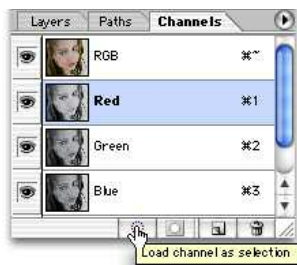
2. Load the Red Channel as a Luminosity Selection (Cmd click on Red Channel).
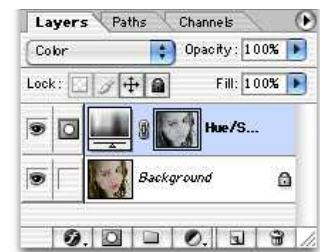
3. Add a HSL Adjustment Layer, and the active Red Luminosity Selection will be automatically loaded as a Layer Mask.
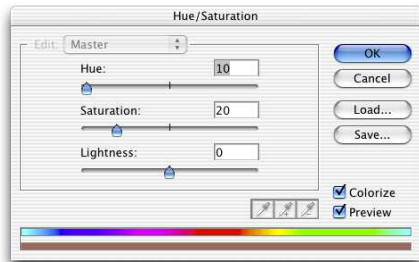
4. Turn on the Colorize option in the HSL dialogue box, and for caucasian skin set the Hue value to between 0º and 10º and desaturate the layer to approximately 20%.

5. Blend the HSL Adjustment Layer with Colour Mode.

6. Load this HSL Layer Mask as a selection (Cmd click on Layer Mask), invert this selection, and feather 10 pixels per 10Mb file size.

7. With the Layer Mask active, fill this blurred inverted selection with Black to create a heavy dark blurred mask.

8. Retouch the HSL Layer Mask to remove this effect from the background or other parts of the image if effected.
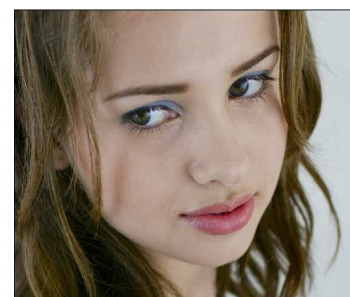
9. Adjust the Hue and Saturation sliders as desired to fine tune the automatic correction of any areas of aberrant skin colour.

Reverse Luminosity Masks - Equalising Skin Tones

This technique combines red luminosity layer masking with luminosity blending to automatically merge a blurred and darkened image of the skin with the original image to smooth out tonal relationships and add a subtle and naturalistic 'glow' to the skin while not affecting any other areas of the image.

1. Open the image and Duplicate the image layer.
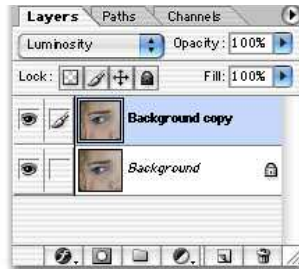
2. Blend the Duplicate Layer on Luminosity.
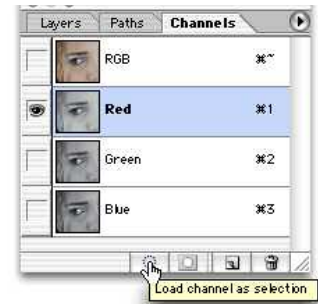
3. Load Red Channel as a Luminosity Selection (Cmd click on Red Channel).

4. Invert this selection (Cmd Shift I) and feather at 50 pixels per 10Mb file size.

5. Fill this selection on the Duplicate Layer with Black. Deselect Selection.
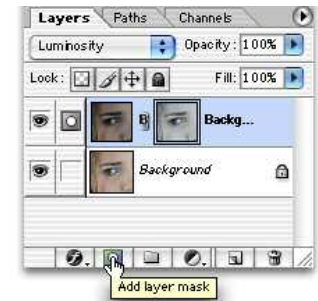
6. Load Background Layer Red Channel as Luminosity Selection, then add a Layer Mask on Duplicate Layer.
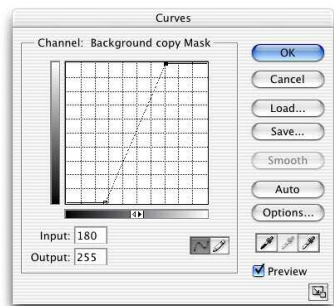
7. Apply a steep curve (eg. 70 in 0 out, 180 in 255 out) to the Layer Mask.
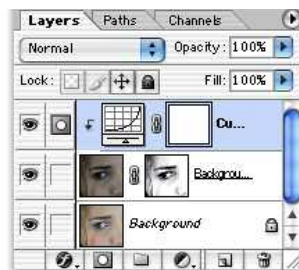
8. Group Curves Adjustment Layer to Duplicate Image Layer.

9. Shift mid point on RGB curve to approximately '80 in 128 out' to correct skin tones back to their original values.

Retouching Skin Tone and Colour

A Luminosity Mask can also be based on a single channel of a multi-channel colour image. This will isolate areas of the image based on the dominant colour of the selected channel. In these examples, the dominant colour of caucasian skin is red, therefore a luminosity mask based on the red channel of an RGB image will predominantly isolate these skin tones. The Red channel loaded as a selection which is then loaded as a Layer Mask on a duplicate image layer will automatically blend any retouching such as blurring or sharpening to those masked areas. The Red Luminosity Layer Mask can itself be retouched to further enhance these effects. An image can also be converted to CMYK or Lab or Greyscale and one of those channels can then be loaded as a luminosity selection and applied to the original image via a layer mask.

Notes on Colour Mode Luminosity Masking

To inspect the Blurred Layer Mask, Option Click on the Layer Mask. It can then be retouched as required, such as removing its influence on background areas. The Colour Blending Mode helps to constrain the HSL colorization (colour) to those areas in the portrait that are different, while reducing the effect on saturation and brightness (by not preserving the image's Luminosity). This procedure can also be captured as an Adobe Photoshop Action to be played back on multiple images.

Notes on Reverse Luminosity Masking

Steps 3 to 5: These steps apply the blurred Red Luminosity to smooth out the skin tones. Blending on Luminosity applies the blur mainly to the skin tones, and not to the skin colour (hue).
Steps 6 to 7: Localises the blurred tones to the skin and not the hair or eye lashes etc.
Steps 8 to 9: Restores overall image luminosity.

Two additionsl steps can be added to the end of this workflow to render the image B&W:
Step 10: Add HSL Adjustment Layer blended on Colour to the top of Layer Stack.
Step 11: Desaturate - 100% to convert to a luminous and glowing B&W image.

These procedures can also be captured as an Adobe Photoshop Action and automatically applied in batch processing for more efficient portrait retouching.

HSL Luminosity Masks – Multiple Colour Cast Masking

Even under controlled lighting conditions significant and conflicting colour casts can appear. Primary colour casts (or objective Colour casts) are most obviously revealed in white clothes and walls, and secondary colour casts (or subjective colour casts) are often revealed in known subject matter. For example in a group portrait there can sometimes be significant and unnatural differences (secondary colour casts) between the skin colour and tonality of individual faces, while there might also be an all-over or primary colour cast from the (green) light reflecting off surrounding foliage. While control of saturation will often neutralise primary colour casts, Hue controls can often be more effective in correcting/balancing secondary colour casts towards a desired reference colour. The following two stage masking method can effectively deal with both primary (objective) and secondary (subjective) colour casts in the same image.

Saturation Mode Luminosity Masking

1. Open an image with multiple conflicting colour cast/s.
2. Add HSL Adjustment Layer and Desaturate the relevant channels to neutralise the primary colour cast (such as in a white shirt or dress).
3. Create a new empty layer and Option Merge Visible Layers (hold down the Option Key while Merging Visible) to combine the HSL Layer and the Image Layer into a new layer. Then turn off the original HSL Layer.
4. Blend this new Layer with Saturation mode to remove the primary colour cast.
5. If required change the Layer Opacity to create a more natural blend between the colour corrected (neutralised) areas and the rest of the image..

Hue Mode Luminosity Masking

6. Sample reference colour (such as preferred skin colour in a group portrait).
7. Create new layer and fill with sampled reference colour.
8. Blend this layer on Hue to correct secondary colour casts (in the other face/s).
9. Change the Opacity of the previously Merged Visible Layer as required to infuse corrected secondary cast into the rest of the image (to 'further correct' primary colour cast) by naturalistically binding together many of the competing pictorial elements in the image.

Hue Mode and Saturation Mode Luminosity Masking can be much more effective than Luminosity Masking alone in isolating conflicting colour casts so that they can be efficiently corrected. This procedure can also be captured as a Photoshop Action.

Unsharp Contrast Reducing Masks - Photographic Masking

This method is the digital equivalent of a photographic Unsharp Contrast Reducing Mask. A photographic unsharp mask was made by contacting printing the original transparency (or negative) onto a sheet of suitable B&W film which was processed to produce a low contrast image. When recombined with the original transparency this mask reduced the effective density range of the transparency (in proportion to mask's gamma). This loss of contrast in the transparency/mask composite was compensated for in printing by using a higher than normal contrast paper. However because the mask was made slightly unsharp or blurred (by various printing techniques), the local contrast of the original transparency was only reduced down to the resolution of the mask's blur. In other words while the mask reduced the overall contrast of the original transparency, the slight blur of the mask 'protected' the local detail in the transparency from also being lowered in contrast. Therefore local contrast in the original transparency was not lowered (by the slightly 'unsharp' mask) but printed at the higher than normal contrast of the printing paper. This produced a print with all over normal contrast but higher than normal local contrast. Hence the unsharp mask effectively increased the 'sharpness' of the print.

In the 'digital darkroom' the image is first duplicated and slightly blurred, then reduced in contrast and density to produce a 'mask', This mask is subtracted from the original image, which darkens and lowers contrast in the image. Once the overall contrast is restored, the image's local contrast is effectively expanded producing the appearance of a significantly sharper image. The pixel radius of the blur controls the distance over which the image will be sharpened.

1. Duplicate the image to produce a Mask.
2. Blur the Mask using Gaussian Blur (start at 1 pixel radius).
3. Reduce the linear Brightness and Contrast of the Mask (start with 30% reductions).
4. Apply this Mask to the original image with Photoshop's Apply Image and the Subtract blending mode at 100% opacity.
5. Reset the image's highlights in Levels.

Notes

The greater the Gaussian Blur (radius in pixels) the greater the area over which the local contrast is preserved, therefore the higher the increase in local contrast (sharpness).

Unsharp Contrast Reducing Masks: Continued

The more the mask's Brightness and Contrast is reduced, the darker will be the mask and the less density that will be subtracted from the original image, which produces less sharpening effect.

Choose a pixel blur radius that just 'protects' (blurs) the detail in the image that you want to sharpen, and lower the Contrast and Brightness of the mask in inverse proportion to the desired increase in local contrast. That is, the lower the Brightness and Contrast settings (-50% rather than -25%) the lower will be the mask's density/contrast and the less density/contrast that the mask will subtract from the image. Therefore the less increase in local contrast that will result after resetting Levels to correct the image's overall reduced contrast. The Levels Gamma slider may also need to be adjusted to rebalance the mid tones. This would be particularly important if the unsharp masked image is being blended with the original image via a Layer Mask, so that both versions (sharpened and unsharpened) can be easily blended together.

© John Billan

Original Image

+ Unsharp Mask
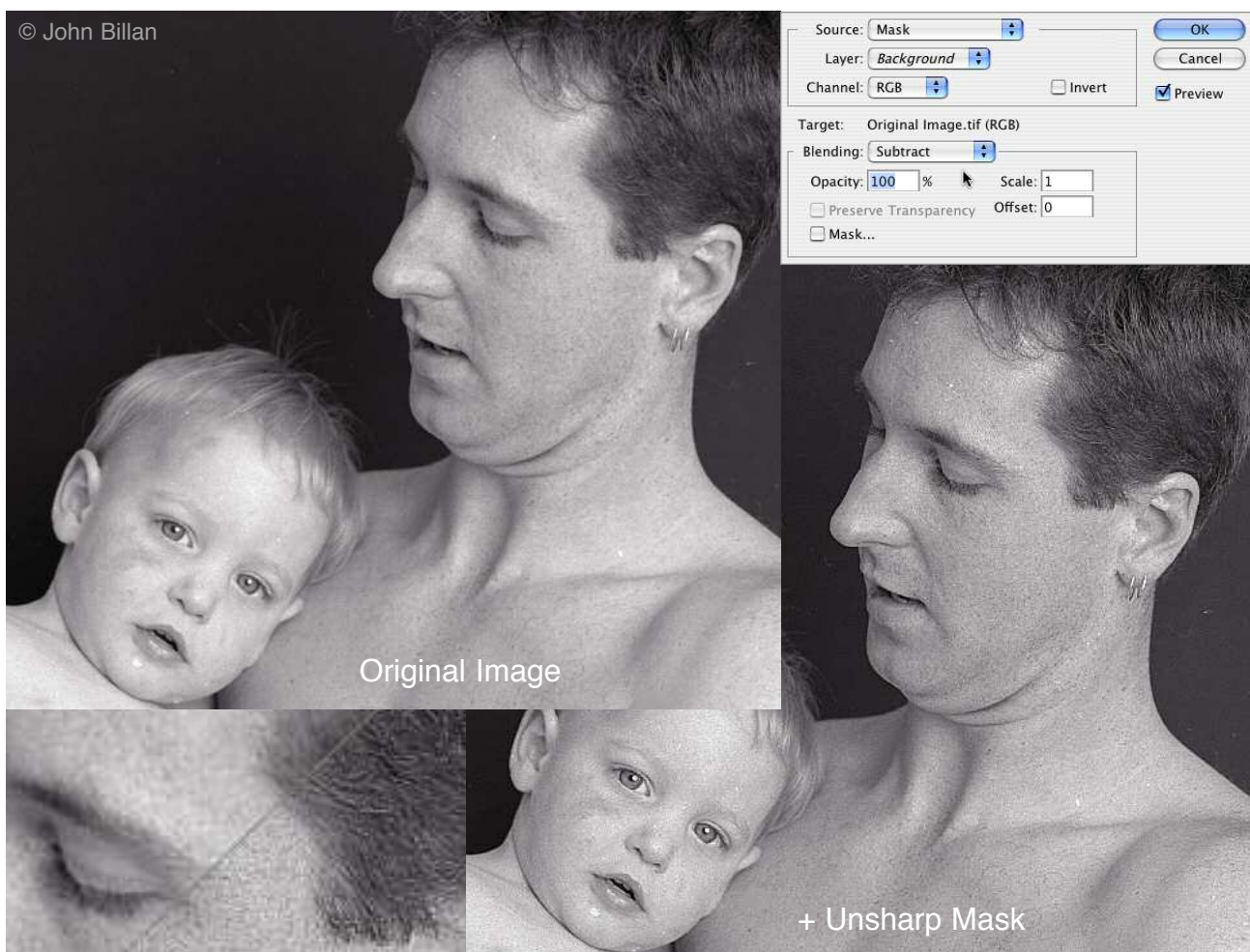
Controlled Edge Sharpening Masks

Both of the following techniques produce variable and easily controlled edge sharpening while minimising the overall increase in noise/sharpening in smooth areas of relatively uniform colour such as a blue sky.

Hi Pass Overlay Masking

1. Duplicate the image layer.
2. Set blending Mode to Overlay (or Softlight for a less pronounced effect).
3. Applied Filters > Other > Hi Pass filter to duplicate layer.
4. The Hi Pass filter (pixel) radius setting controls where the image is sharpened, because it restricts the contrast increasing Overlay mode to just the edges.
5. The Hi Pass Overlay sharpening mask can be "dodged & burned' for local control.

Find Edges Softlight Masking

1. Duplicate the image layer twice.
2. Apply the 'Filters > Stylise > Glowing Edges' filter to one duplicate layer.
3. Apply the 'Filters > Sharpening > Unsharp Mask' filter to the other duplicate layer.
4. Use the 'Image > Apply Image' tool to add the 'Glowing Edges' layer to a Layer Mask on the Sharpened layer.
5. Discard the 'Glowing Edges' duplicate layer.
6. Blend the Sharpened (Layer Masked) layer in Softlight mode (or Overlay Mode for a more pronounced effect) to locally enhance image luminosity.
7. Apply Levels to the 'Glowing Edges' Layer Mask and reduce its maximum density (shadow slider) to control the blend of sharpened/unsharpened areas in the image. Also adjust the highlights (slider) to produce the best edge definition.

Any sharpening technique can also be applied to the 'L' channel in Lab colour mode to minimise colour fringing and related sharpening artifacts. However the 'Glowing Edges' filter is not available in Lab mode, so the 'Fine Edges' filter must be used instead. Alternatively blend on Luminosity to minimise unwanted colour artifacts.

Of the two techniques, 'Find Edges Softlight Masking' allows the greatest control. In particular it allows a more precise definiton of which edges are sharpened, and the width over which the apparent sharpening effect (softlight contrast increase) is applied.

Part 3

CIE LAB

Working in L*a*b*

One of the advantages of working in CIE Lab colour space is that it separates the image into a Lightness channel (L*) and two colour channels (a* and b*). This allows lightness to be edited independently of colour, and greatly simplifies many image editing problems.

Original LAB Image

Unlike RGB or CMYK, Lab separates Hue (Colour) from Tone.

Lab_Lightness (L*) Channel

Lab_a*b* Channels

Removing Lightness from the image leaves the Chromaticity of the image (hue + saturation). Chromaticity + Lightness = Lab

Lab_a* Channel (Magenta - Green)

Lab_b* Channel (Yellow - Blue)
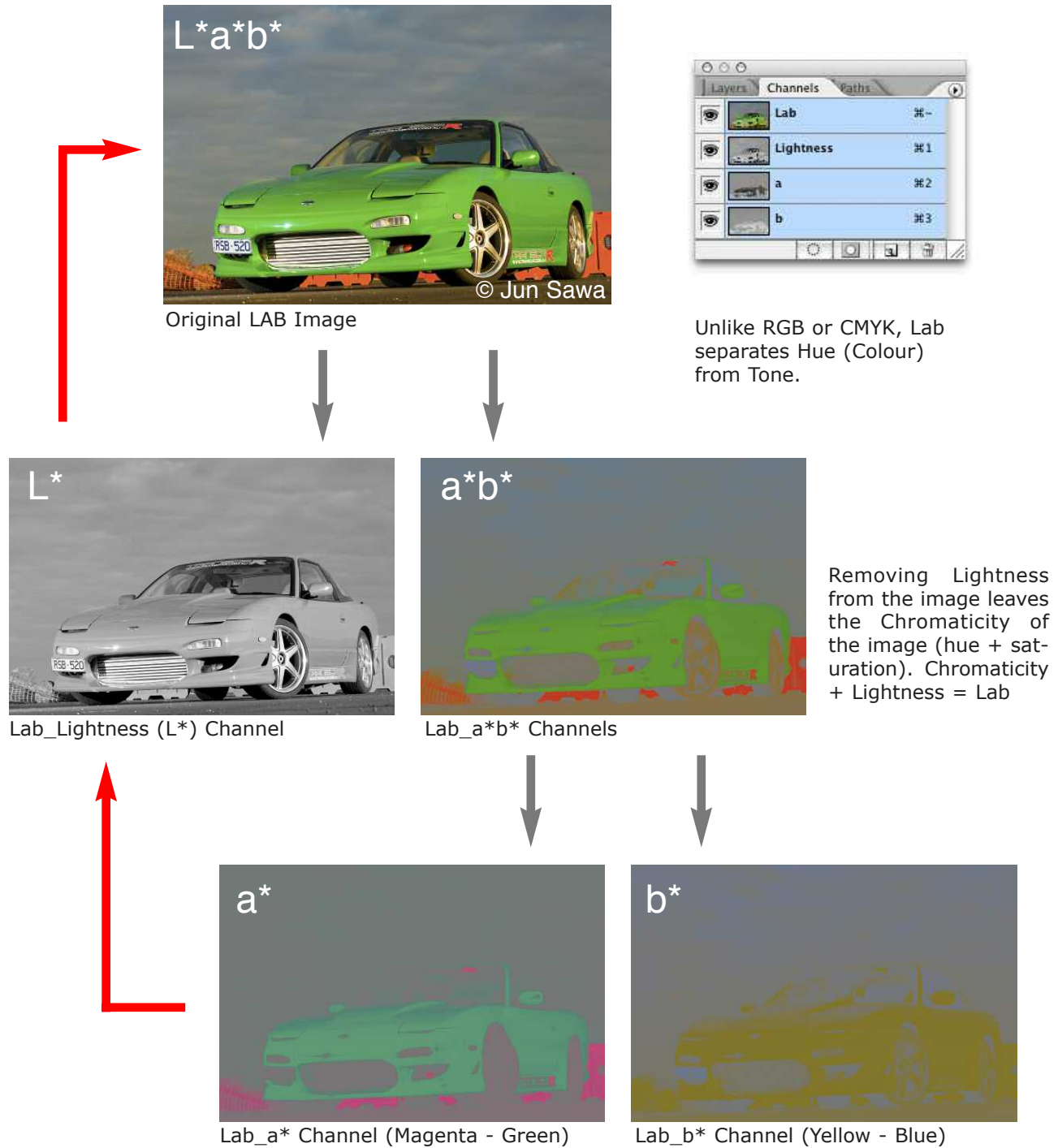
Editing in L*a*b*

L*a*b* is a very powerful space to edit images in, but it can take some practice to get used to the way it functions. The a* and b* curves below indicate how colour is distributed in Lab colour space. Lab colour numbers extend from -128 (Green and Blue) to +127 (Magenta and Yellow). Therefore negative a* or b* numbers indicate cool colours, while positive a* and b* numbers indicate warm colours. For example:
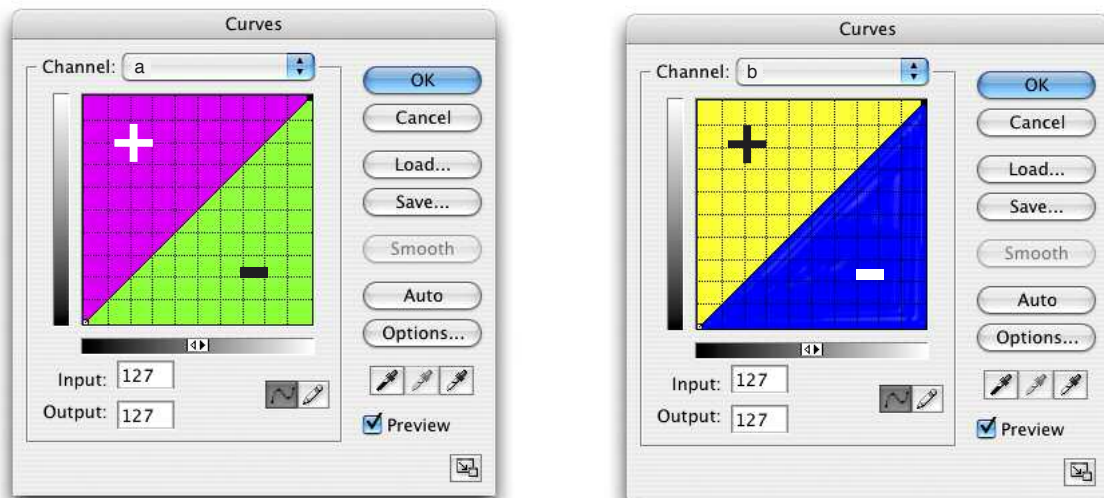
Note that Photoshop CS2 incorrectly prevents more than three integers to be displayed in the Curves dialogue box, so that all a* or b* numbers less than -99 will not appear. This error has only occurred in CS2. All other versions correctly display Lab Colour numbers. Also because Lab is a theoretical colour appearance model of human colour vision, only a portion of Lab will be used by RGB and CMYK colour spaces. While all RGB numbers will have a Lab equivalent, not all Lab numbers will have equivalent RGB numbers

Lab_L*a*

Lab_L*b*

The separation of Lightness from Colour presents many unique editing opportunities.
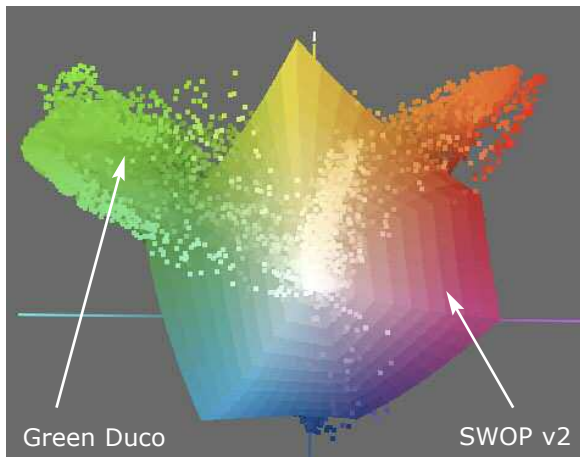
Out of Gamut Colours

Saturated colours such as the green paint of this car can be accurately captured on film or with a DSLR camera. Many of these colours can also be preserved in the Adobe RGB (1998) working colour space. But once printed they becomes dull, flat and lifeless.

Adobe RGB 1998 (Working Space Profile)

U.S. Web Coated (SWOP) v2 (Press profile)

Green Duco   SWOP v2

Many of the colours in this image (35.4% $\Delta E94>2.0$) lie outside of the US Web Coated (SWOP) v2. press profile. This means that they can't be accurately reproduced in this print space. The SWOP profile will render them as the closest but not identical match to the original colours.

The Colormetric tables in the US Web Coated (SWOP) v2 press profile will compress many of the out-of-gamut colours into a very small range of colours, even rendering different shades as a single colour. For example in the right hand diagram, many of the greens in the car duco are being mapped into the same point (the same colour) in the SWOP v2 colour space. This is why the colours are rendered as a flat, dull, undifferentiated composite green in print.

SWOP v2

Many greens are rendered the same green
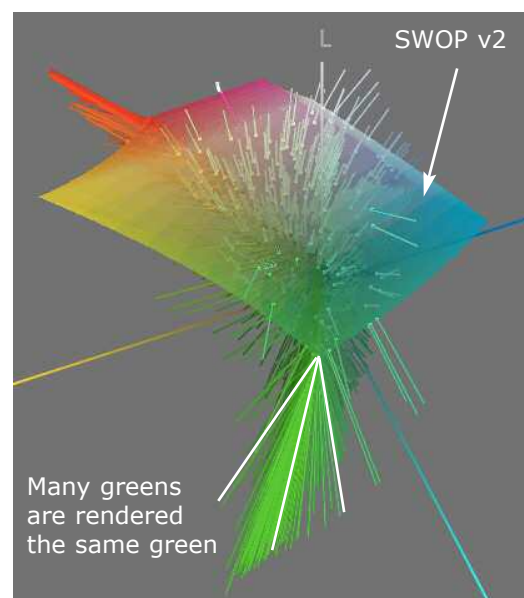
Editing Out of Gamut Colours

Whenever the Perceptual gamut mapping intent in a destination profile fails to adequately separate out-of-gamut colours, then these colours will need to be manually edited into the destination gamut. One approach compresses the colour gamut (range of saturation) to bring the image into gamut and then expands the tonal contrast (range of tones) to compensate for the reduced colourfulness. The Lab format is an ideal working space to gamut compress an image because it separates lightness (tone) from colour.

© Jun Sawa

Lab edited image softproofed in U.S. Web Coated (SWOP) v2
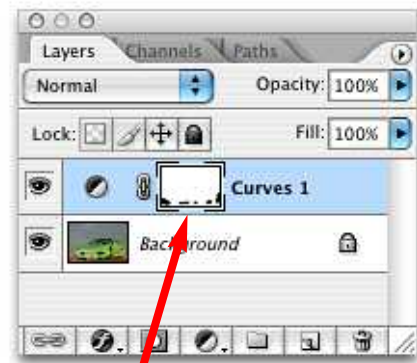
The Layer Mask removes the gamut compress from the orange (magenta-yellow) barriers behind the car
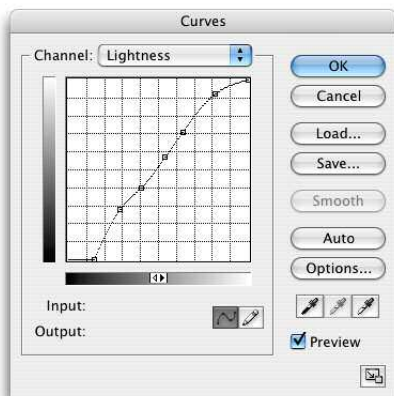
Lightness (Contrast) Curve
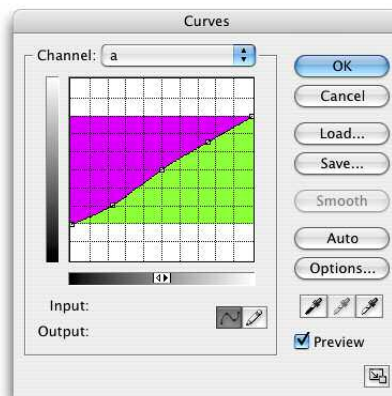
a* (Magenta to Green) Curve
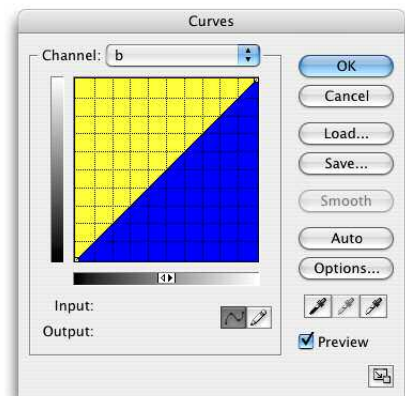
b* (Yellow to Blue) Curve

The image is converted into Lab and softproofed through the output profile, in this case U.S. Web Coated (SWOP) v2 which is a standard press profile for high quality magazine reproduction. The out-of-gamut greens are located in the a* channel (green to magenta) and not the b* (blue to yellow) channel. Reducing the gradient of the a* curve therefore reduces the range (gamut) of greens in the image. To compensate for the reduced green 'vibrancy', the gradient of the L* (tone) curve is increased to enhance local separation.

Expanding Colour Presence

Adjusting the a* and b* colour curves alters the chromaticity of the image somewhat independently of its lightness. This can significantly increase colour contrast and separation (presence) without distorting the tonal composition of an image

Original image © Jim McFarlane
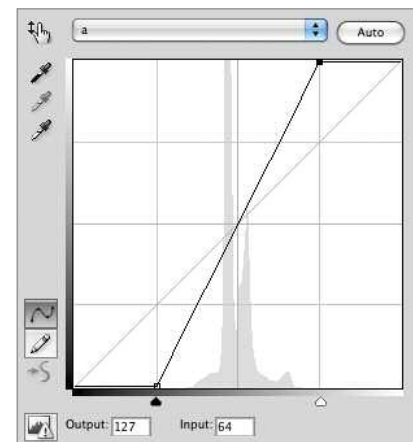
a* channel contrast increase
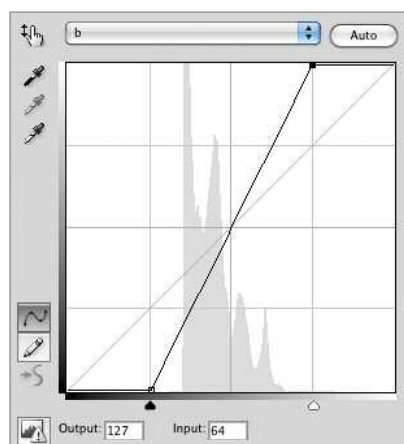
b* channel contrast increase
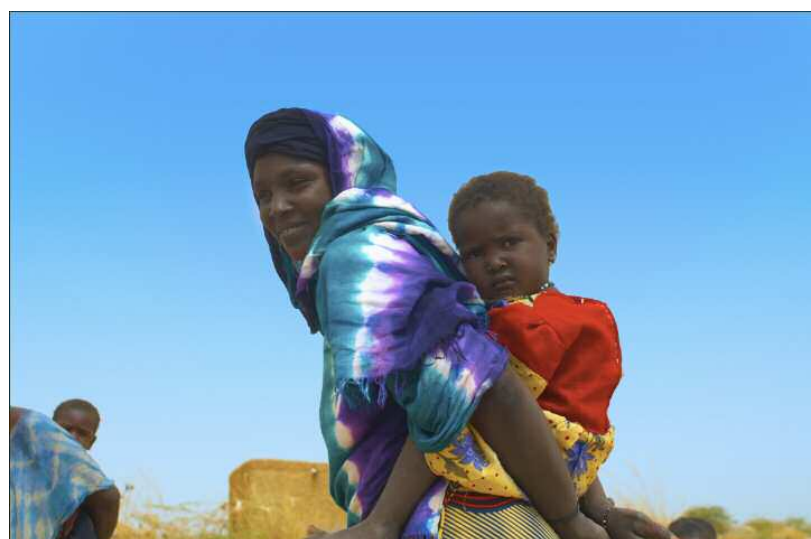
After converting to LAB and increasing colour contrast

Increasing the steepness of the a* and b* curves while maintaining their straight lines, significantly increases the colour contrast (or presence) in an image. Clipping the curves equally on either side of middle grey intensifies rather than distorts the colour composition.To facilitate this move the black and white Levels sliders equal distances

LAB Quantisation Errors

L*a*b* is a device independent and very large colour space that encompasses all input and output device colour spaces. It is therefore sometimes a preferred archiving colour space. But this can also be a disadvantage if only subtle editing changes are required because of the relatively large colour jumps between adjacent levels in the a* and b* channels. It is also not possible to judge colour balance and colour clipping by visually inspecting the a* and b* histograms. In general it is safest to work in 16 bits per channel when converting into or out of Lab space. Converting an 8 bit file from RGB to Lab and then back to Lab reduces the file bit depth between approximately 23 and 34 levels.

8 bit RGB continuous tone gradient

Lab is also the profile connection space in many colour manged trasnformations.
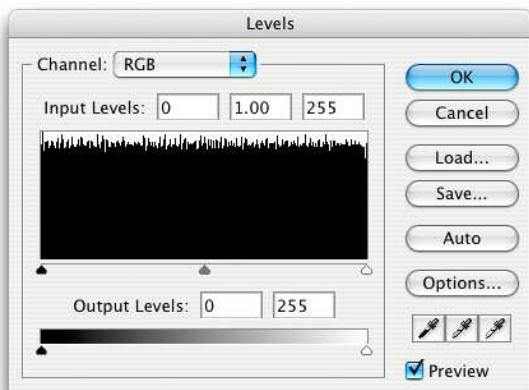
RGB Continuous Tone Gradient Histogram
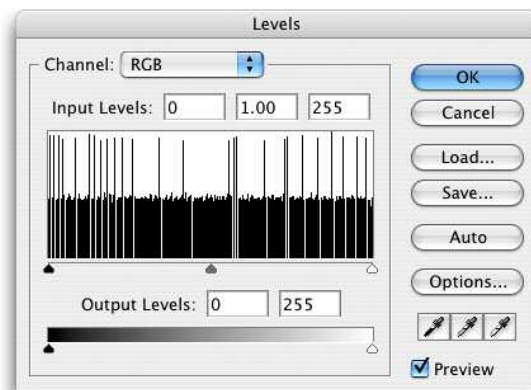
sRGB to Lab to sRGB (- 26 Levels)
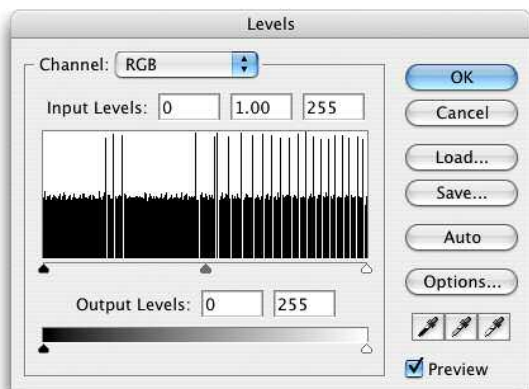
Chrome Space to Lab to Chrome Space (- 23 Levels)
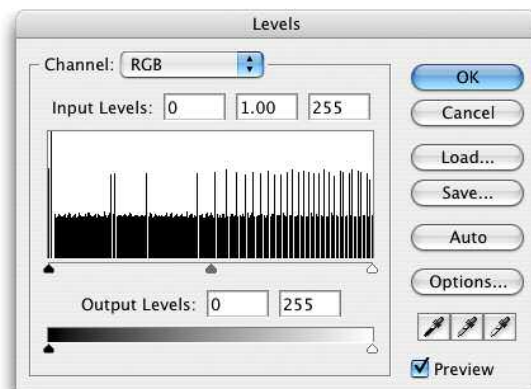
ProPhoto RGB to Lab to ProPhoto RGB (-34 Levels)

Working in 16 bits per channel renders these quantisation errors insignificant. Therefore 16 bit Lab can be considered a viable working, editing and archiving colour space.

Independent Luminosity and Colour Editing

In Photoshop it is difficult to quickly and accurately edit the brightness of an image independently of its colour (hue and saturation). Close inspection of Photoshop's HSB Info Palette reveals that editing Lightness in LAB mode does not restrict the edits to the image's lightness/brightness, but also changes saturation.

When editing in RGB Mode, Photoshop's Luminosity and Color Blending Modes also do not restrict the edits solely to the luminosity or colour of the image, but also effect its hue and saturation. Also when editing an RGB curve, control points not being edited are still effected despite being 'locked down'. That is, specific RGB curve edits also effect areas not being 'edited'. These unwanted changes then need to be corrected, which then need to corrected, and so on, resulting in an inaccurate and inefficient image editing workflow.

The solution to this problem entails first extracting the Luminosity of an RGB image in a duplicate layer, blending this layer on Luminosity, and then Clipping an RGB curve to it. This layer combination ensures RGB Curve control points remain unaffected when other control points are changed, enabling very precise and accurate image edits. It also preserves the hue of the image (courtesy of Luminosity blending), though unfortunately saturation will still change due to the way Photoshop implements brightness and saturation.

- **Brightness** = brightest channel as a percentage of maximum possible brightness.

- **Saturation** = the difference between the brightest and darkest channels expressed as a percentage of the brightest channel.

For example, the RGB colour 192R 128G 64B has a brightness of 75% (192/255 x 100/1) while the saturation is 66% (192 - 64/192 x 100/1). Therefore any change in brightness (the value of the brightest channel) will result in a change in the difference between the brightest and darkest channels, consequently the saturation value *must* also change.

Adding a Vibrance Adjustment Layer blended on Saturation and adjusting the Vibrance slider will help to minimise brightness and hue changes in the image while moderating any unwelcome increase in saturation resulting from RGB Luminosity Curve edits. This arrangement ensures all Adjustment Layers, especially Curves and Levels, as well as the Info Palette read outs will now function with unequalled precision and accuracy.

Extracting Luminosity

There are numerous ways to extract and edit the Luminosity of an RGB image. The Luminosity formula that Photoshop uses for all conversions to RGB neutrality (apart from a Mode change to Greyscale) combine 30% of the Red Channel with 59% of the Green Channel and 11% of the Blue Channel. A Channel Mixer Adjustment Layer in Monochrome Mode mixing these RGB percentages can be blended on Luminosity to separate the luminosity from hue and saturation.
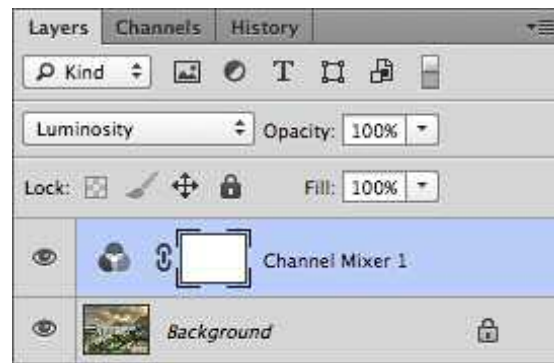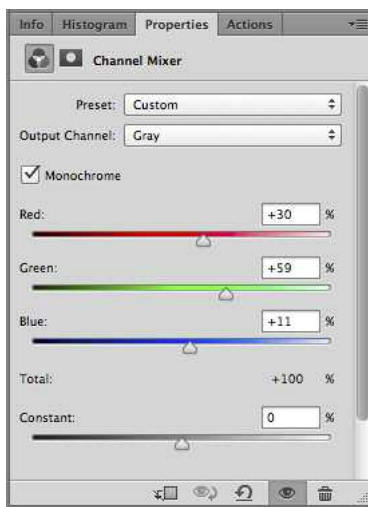
Channel Mixer Luminosity Extraction

Different RGB percentages will creatively alter the picture's luminosity composition. For example, blending 100% Green (0% Red and Blue) on Luminosity increases the modeling and expressive presence of faces and skin tones.

Alternatively Color blending 50% Grey will also 'extract the luminosity as follows:
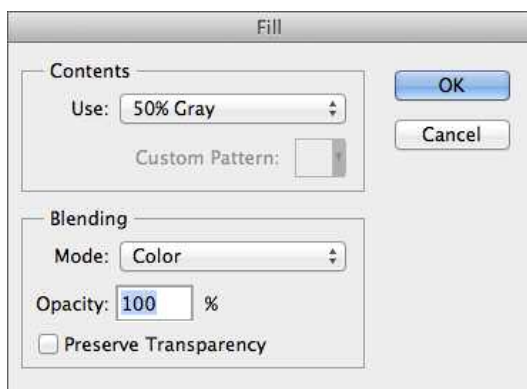
Color Blending 50% Grey Luminosity Extraction
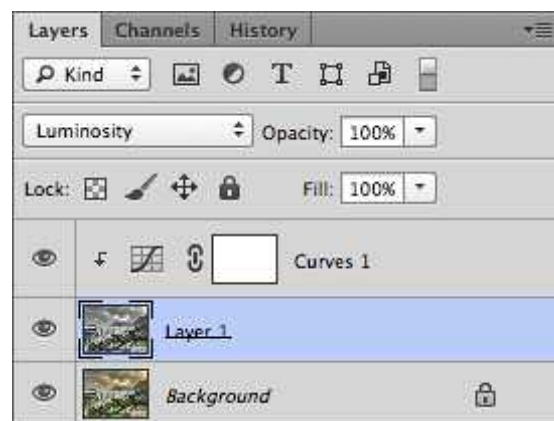
Part 4

Proofing

Calibration and Profiling

Ideally the hardware device being profiled is initially adjusted to approximate as closely as possible the desired calibration values. Additional software adjustments, if required, are made to bring the system into perfect calibration. At a minimum this involves reproducing equal RGB triplets such as 100R 100G 100B as neutral greys in the device.

Once the equipment has been calibrated, its calibrated state and the range of colours it represents is then captured by measuring a series of known colours with a Colorimeter or Spectrophotometer. The difference between the original (input) data and the measured (output) data is rendered into a profile by profile creation software (such as Xrite's Profile Maker) that characterises how that device represents colour in a colour managed system.

All devices are capable of being profiled, but not all devices are capable of being calibrated due to software and/or hardware limitations. In other words, the character of any device can be captured as a profile, irrespective of whether that device is in a calibrated state or not. But an uncalibrated device will require the profile to also 'correct' its uncalibrated state. In many cases this is an unreasonable task for the profile which is really only intended to capture its state. Therefore less than optimum reproduction may result.

Monitor Calibration

Monitor calibration adjusts three parameters:

Colour Temperature • Tone Reproduction • Luminance

Each parameter needs to be referred to the conditions of use, for example whether the image will be edited on the monitor independent of printed output (ISO 3664), or compared to printed output (ISO 12647). A table on the following page summarises the main characteristics of each ISO standard. Some LCD monitors such as Apple screens only have a backlight brightness control, therefore their hardware can't be adjusted, and all calibration must be accomplished by video card LUT adjustments. This results in a degraded video signal being sent to the screen. High quality LCD graphics monitors made by companies like Eizo, Quato and NEC incorporate 12-bit gamma correction and 14-bit or 16-bit internal processing where all calibrations are carried out semi-automatically via hardware adjustments, leaving the computer's video card (and signal) unadjusted.

Colour Temperature

When a monitor to print match is not required, begin by calibrating the monitor to a colour temperature of 6500ºK (ISO 3664). Once calibrated, fill the screen with a greyscale image and if required adjust the monitor's colour temperature until the greyscale image appears neutral. That is, neither too cool (cyan-blue) or too warm (red-yellow) relative to the surrounding environment.

If the monitor must simulate printed output, begin by calibrating to 5000ºK (ISO 12467) and then adjust its colour temperature to visually match the print's white point (paper white). A Solux 4700ºK lamp (www.solux.net) usually provides a close visual match to a 5000ºK monitor white point. Fluorescent tubes manufactured for soft proofing (www.gtilite.com & www.just-normlicht.com) with a correlated colour temperature of 5000ºK usually provide a close visual match to a monitor calibrated between 5500ºK and 6000ºK. The ambient lighting and surrounding environment will also effect the appearance of the screen, but in all cases a greyscale image, whether a softproof or a print, should appear visually neutral relative to the surrounding environment.

|	ISO 3664	ISO 12646
Ambient Light White Point	CIE D50 (5000ºK or less)	CIE D50 (5000ºK or less)
Ambient Light Editing Areas	64 to 32 lux (or lower)	32 lux (or lower)
Ambient Light Proofing Areas	1,500 to 2,500 lux	1,500 to 2,500 lux
Ambient Light Extraneous	Baffle from view all windows, point sources, etc	Baffle from view all windows, point sources, etc
Ambient Light Glare	No reflections on monitor	No reflections on monitor
Monitor White Point	CIE D65	CIE D50
Monitor White Luminance	$75cd/m^2$ to $100cd/m^2$	$80cd/m^2$ to $120cd/m^2$
Environmental Surfaces	Colour-neutral surfaces: Walls 60% reflectance or less	Colour-neutral surfaces: Walls 60% reflectance or less

Summary of main monitor calibration standards

Tone Reproduction

Gamma correction is important for the satisfactory display of an image on a monitor with non-colour managed content and applications. For example, a PC interface is designed to be viewed at a gamma of 2.2, while a Macintosh interface is designed to be viewed at a gamma of 1.8. On the other hand, colour managed applications like Adobe Photoshop™ will automatically transform image data to the current monitor profile ensuring correct values are displayed on screen irrespective of the monitor's gamma. The following chart illustrates monitor gamma curves and their resulting non-colour managed grey scales.
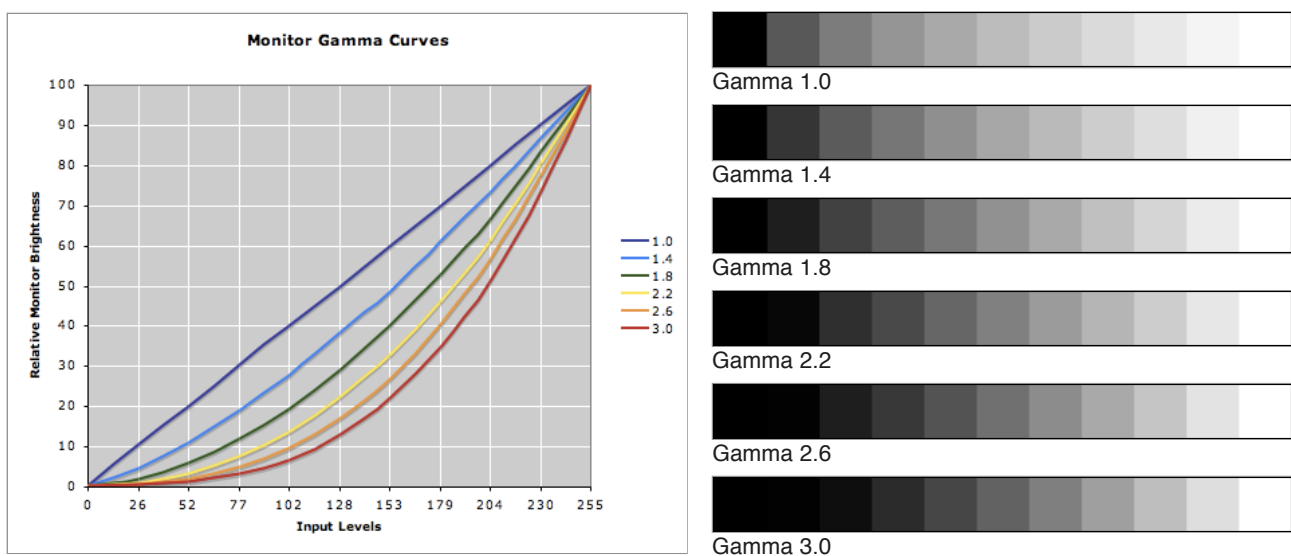

A Windows based PC interface is designed to be viewed at a gamma of 2.2, while a Macintosh OS interface is designed to be viewed at a gamma of 1.8. The native gamma of monitors will also vary between different models, though the average value is assumed to be 2.22 in most international standards. In any case equal-interval differences in any gamma transformation do not correspond to equal brightness differences as perceived by a human observer, therefore neither 1.8 or 2.2 renders 128R 128G 128B as middle grey, that is as a luminance perceived to be mid way between maximum black and white.

An alternative approach to a monitor's tone reproduction calibrates its tonal response to Lightness (L*) which is the human perception of relative brightness; that is brightness relative to a similarly illuminated area that appears white. An L* calibrated monitor represents equal intervals as equal brightness steps, rendering it linear with respect to the human visual system. Note that some monitor calibration software does not support this option, and Windows and Macintosh interfaces are not designed for it. This may adversely effect the display of internet, DVD and other non-colour managed content.

Gamma 2.2 Brightness Curve & Greyscale

Lightness (L*) Curve & Greyscale
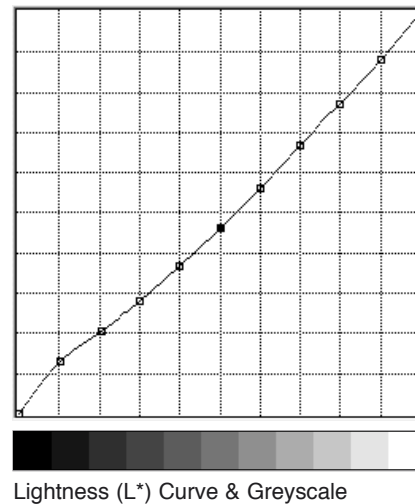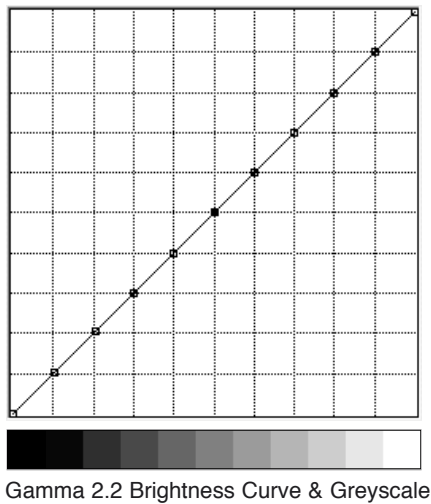
Another approach selects the same monitor gamma as the working space gamma to minimise any loss of image levels during the video card LUT or tone curve transformation. Therefore if you work with ProPhoto RGB, Apple RGB or ColorMatch RGB calibrate your monitor to a gamma of 1.8, or gamma 2.2 if you work with Adobe RGB or sRGB, or L* if you work with ECI RGB v1. If you work with a variety of colour spaces and/or colour managed/non-colour managed applications, a monitor gamma of 2.2 is a good compromise.

Luminance

Three interrelated factors combine to define the required monitor luminance levels:

White Luminance • Black Luminance • Contrast Ratio

The difference between a monitor's white luminance and black luminance equals its contrast ratio. Increasing white luminance does not vary the minimum black luminance of an LCD monitor. Therefore the brighter the monitor's white luminance the higher its contrast ratio. Controlling the black luminance level is important for precisely adjusting the monitor's contrast and adapting it to specific output conditions. This is particularly critical when the aim is to simulate printed output, that is to 'soft proof' (predict) on the monitor the appearance of the printed image.

White Luminance

Begin by calibrating the monitor to a white luminance of 100.0 cd/m^2, then compare a 'colour managed test print under your standard viewing light' with its soft proofed image on the monitor. Use an image containing large areas of shadow detail in this evaluation.

If the shadows appear more visible and detailed in the monitor's softproof than in the print, the monitor's white luminance will need to be lowered, or the print viewing light's brightness increased. In practice the monitor's white luminance will usually fall between 80.0 cd/m^2 and 110.0 cd./m^2 when referenced to the printed image - depending on the ambient brightness of the working environment and the print viewing conditions. A white luminance of 100.0 cd/m^2 also broadly equates to a print viewing illuminance of 400 lux.

Black Luminance

Begin by calibrating the monitor's black luminance to 0.40cd/m^2. Spectrophotometers and colorimeters used in monitor calibration are less accurate at measuring black luminance compared with measuring white luminance. Aim for a final black luminance between 0.3 cd/m^2 and 0.5 cd/m^2 in the standard working environment. On-screen flare will dramatically effect the appearance of the black luminance and shadow detail, and its softproofed relationship to an actual print. Therefore care must be taken to exclude all direct reflections on the screen and reduce flare by keeping ambient light levels low.

Contrast Ratio

Calibrating the monitor's white luminance to 100.0 cd/m^2 and black luminance to 0.4 cd/m^2 results in a monitor contrast ratio of approximately 1:250. This is ideal for soft-proofing because it simulates a rich glossy print's density range of approximately D2.40 (Dmax 2.50 - Dmin 0.10) or 8 EV (2.40 ÷ 0.3 = 8 EV) which equals a contrast ratio of 1:2^8 = 1:256.

Not all monitor calibration/profiling applications enable the manual adjustment of the monitor's black luminance, but most nevertheless report what it is as a result of the calibration sequence. Note this value and adjust the white luminance and recalibrate to achieve approximately a 1:250 monitor contrast ratio. Raising the monitor white luminance above 100cd/m^2 and thereby also increasing its contrast will only be required to counteract the contrast lowering effect of screen flare due to a brighter than standard working environment, and/or a brighter than standard black luminance. In practice a white luminance greater than 140.0 cd/m^2 or a perceived contrast ratio greater than 1:250 will normally not be required.

Monitors can be calibrated for different tasks that predict different output conditions. Defining those tasks and then adapting the monitor to them is fundamental to the calibration process. Some monitor calibration software (eg. Eizo Color Navigator) can store preset calibrations that can be recalled when ever those conditions are required.

Soft and Hard Proofing

A Photographic Studio operates with a well setup proofing area where hard copy prints can be accurately compared against each other as well as with a soft proof on a calibrated monitor. These proofing conditions comply with current international standards. However there are significant differences between the hard proofing and soft proofing environments as well as the Design Studio that receives the images.
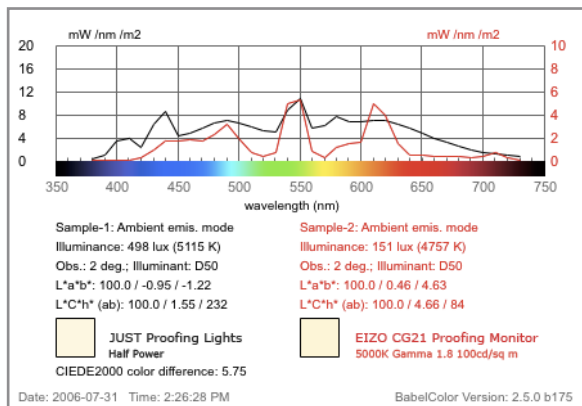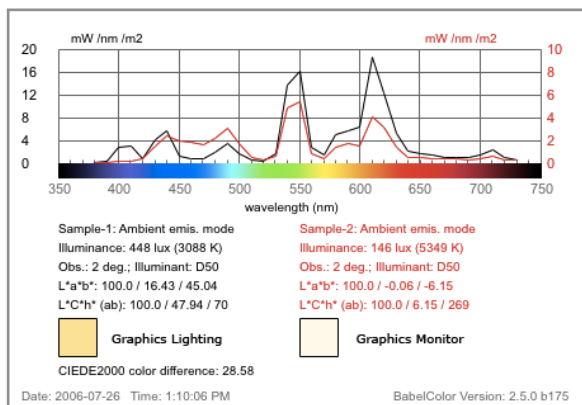

Photographic Studio Proofing Lights & Monitor

The EIZO proofing monitor (calibrated to 5000ºK, Gamma 1.8, 100cd/sq m) compared with the JUST or GTI proofing lights indicates that there is a relatively poor match between the phosphors of both light sources. The relative dip at 650nm in the monitor spectrum and the peaks at 410nm and 440nm in the JUST or GTI 5000ºK spectrum predict that reds on the monitor will appear more orange than in accurate proof prints, while blues will appear more indigo in proof prints under the JUST or GTI tubes than on the proofing monitor. This is not untypical of such a proofing situation and must be taken into account when evaluating the images.
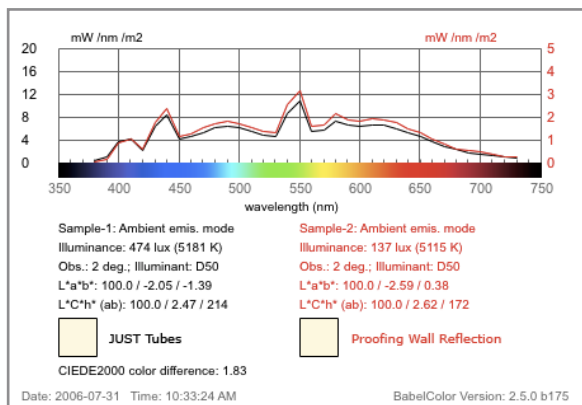
Photographic Proofing Lights & Viewing Environmenmt

The hard proofing setup includes a dark grey painted wall against which the proof prints are viewed under JUST or GTI 5000ºK lights. The grey paint is a relatively neutral colour and these spectrums indicate it will not contribute any colour casts or inaccuracies to the hard proofing process. However the reflectance of this grey proofing wall is quite low, and will appear to increase the density of images printed on thin paper (less than approx. 200gsm) when held against it. In these cases it might be more accurate to place several sheets of plain printing paper of the same type behind the proof print to correct this.


Design Studio Proofing Lights & Monitor

There is a very significant discrepancy of over 2000ºK between the ambient fluorescent lighting in the Design Studio and the colour temperature and appearance of their monitors compared with the Photographic Studio. Accurate evaluations of hard copy proofs and screen based soft proofed images will be impossible under these conditions. There may also be increased eye strain and fatigue from constantly adapting backwards and forwards from screen to desk environments. It would be preferable to replace the current fluorescent tubes with the same corrected JUST or GTI 5000ºK tubes as used in the Photographic Studio.
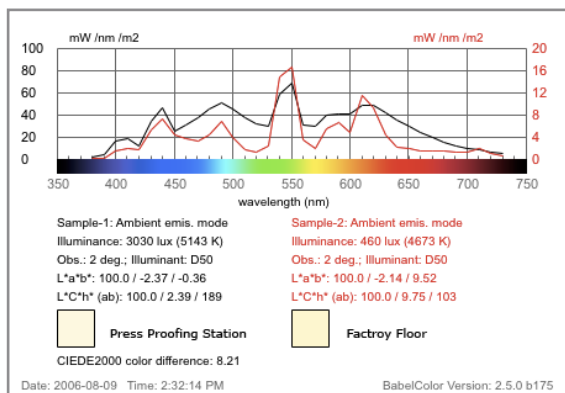
Press Proofing

ISO 3664 and ISO 12464 stipulate the acceptable range of ambient lighting in proofing areas to be between 1550 lux and 2500 lux and a CIE D50 white point of 5000°K or less. Three Printing Services were visited and their proofing conditions measured, but no one meet all of the ISO criteria. This makes it difficult to accurately match a print with a proof print supplied by the Photographic or Design Studio. A small portable JUST or GTI viewing booth might be required under these conditions to provide a reliable comparison.
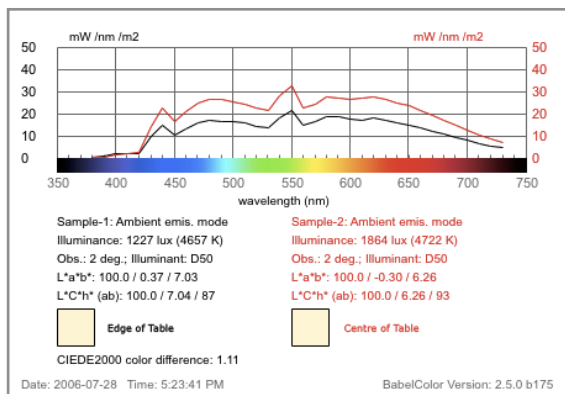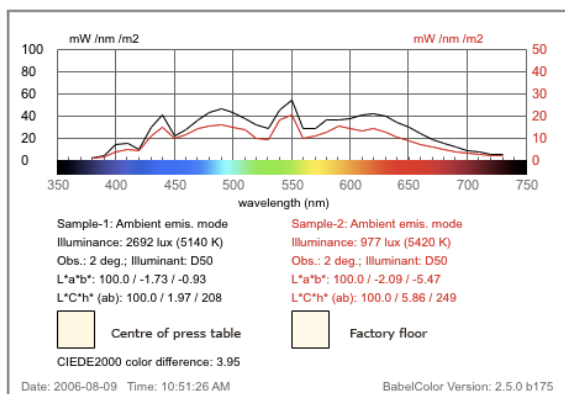

Press A

The proofing light levels at this Lab were below the ISO standards, though represented the closest match to the Photographic Studio's proofing facility when the JUST or GTI lamps are run at full power. The correlated colour temperature of 4722°K is acceptable and the absence of any spike around 380nm to 410nm indicates that there would not be any observation errors due to differences between the levels of artificial whiting agents in the final prints and proof prints.

Press B

The 3030 lux measured in the centre of the print proofing table and a correlated colour temperature of 5143°K clearly exceed ISO standards, though the Lab_b* value of -0.36 does not present any additional problems. The spike at 410nm will extenuate any optical brightener differences between the press sheet and proofing paper. This emphasises the need to use print proofing papers that have a Lab_b* value as close as possible to the paper being used to make the final prints on.
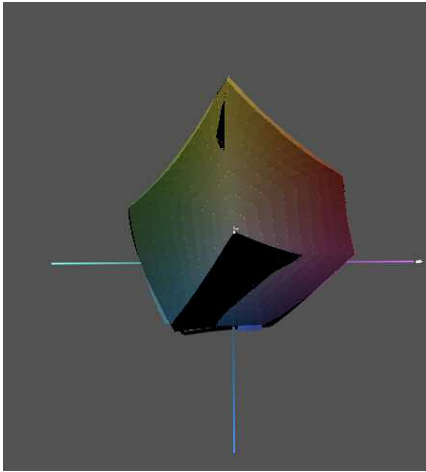

Press C

These conditions were the closest to the ISO standards but still did not meet them. The close correlation between the general factory illumination and the print proofing station illumination indicates that environmental influences will be at a minimum during print checks. However the spike around 400nm to 410nm implies that differences between the levels of artificial whiting agents in final prints and proof prints supplied by the photographer will be a potential source of observation errors during these print checks.
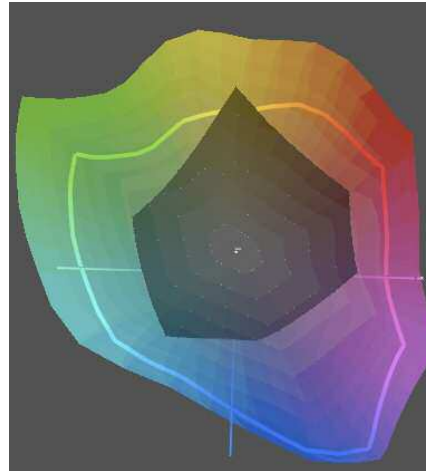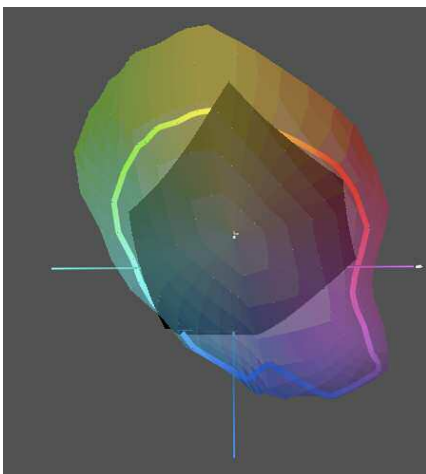
Gamut Compression

A pre-press CMYK proofing profile should accurately represent the gamut of the printing press it is proofing. The capture gamut of the digital camera should exceed the press profile in order to maximise the reproduced colour gamut on press.
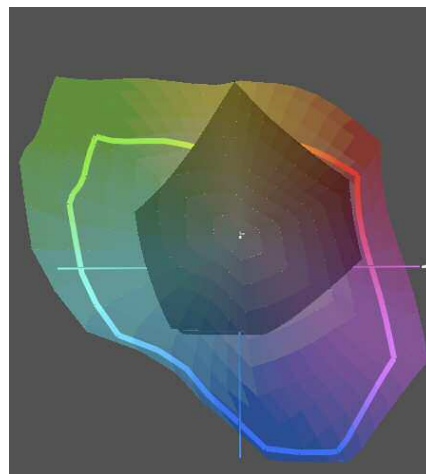

Press versus Pre Press Proofing Profile

Canon 1Ds Mk II Digital SLR

Sinar 54 Medium Format Digital Back

Phase One P45 Medium Format Digital Back

While the above 2D projections aren't as revealing as a full 3D projection, it is still obvious that the digital camera backs cover a larger colour gamut than the press profile. This guarantees that the maximum press gamut can be maintained. However there is still the problem of compressing the capture gamut into the press gamut when ever it exceeds it. The more perceptually uniform the capture gamut is relative to the press gamut, the more harmoniously its gamut can be perceptually compressed phnto the press gamut. In the above examples, the Canon 1Ds Mk II gamut provides the best solution to this problem.
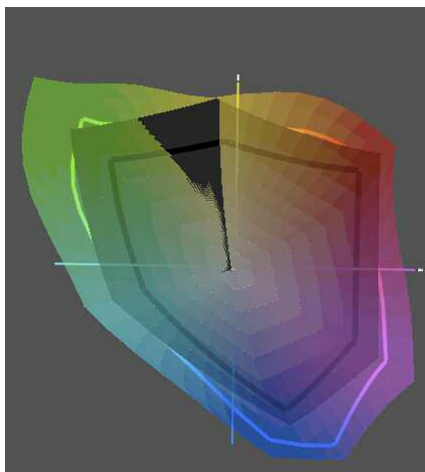
Soft Proofing Capture Gamuts

A comparison between an EIZO CG21 proofing monitor profile at 5000ºK, Gamma 1.8, 100cd/sq m, reveals that the Canon 1Ds Mk II DSLR and Phase One P45 medium format digital camera back comfortably exceed the proofing monitor's gamut. The proofing monitor also encompasses virtually all of the pre press output gamut.
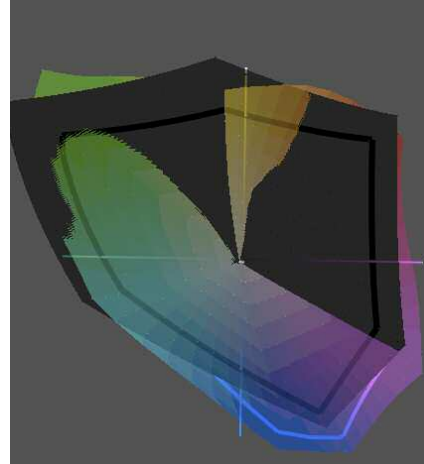

EIZO CG21 Monitor vs. Phase One P45
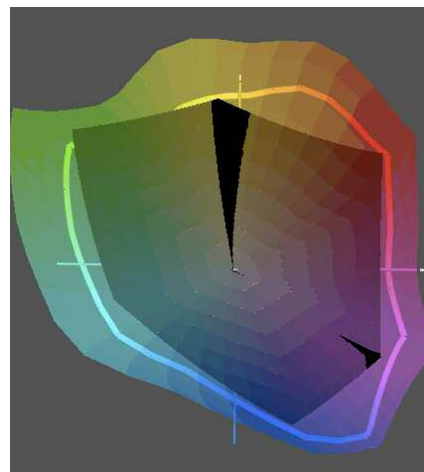
EIZO CG21 Monitor vs. Canon 1Ds Mk II
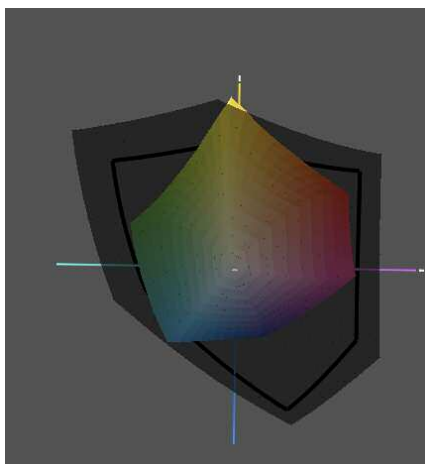
EIZO CG21 Monitor vs. Pre Press Profile


EIZO CG221 Monitor vs. Phase One P45

The EIZO CG21 monitor can accurately display most of the colours that can be printed on press, but it can not display all the colours that can be captured on film or with high end digital cameras. The automatic gamut compression from the capture profile to the monitor profile does not necessarily result in the best interpretation of the subject. It would be preferable to manually compress the capture gamut so as to retain the highest quality reproduction of the subject. However this requires a state-of-the-art EZIO CG221 monitor to accurately represent the capture gamut so that the image can be harmoniously gamut compressed while retaining its original sparkle, presence and dimensionality.

Soft Proofing Gamut Analysis

The following gamut plots of a standard proofing monitor (5000°K, Gamma 1.8, 100cd/sq m) illustrate its limitations and how it prevents an accurate soft proof of the reflective subject. It highlights the problem of depending on soft proofing as a critical evaluation of image capture of subjects that exceed the gamut of the monitor.
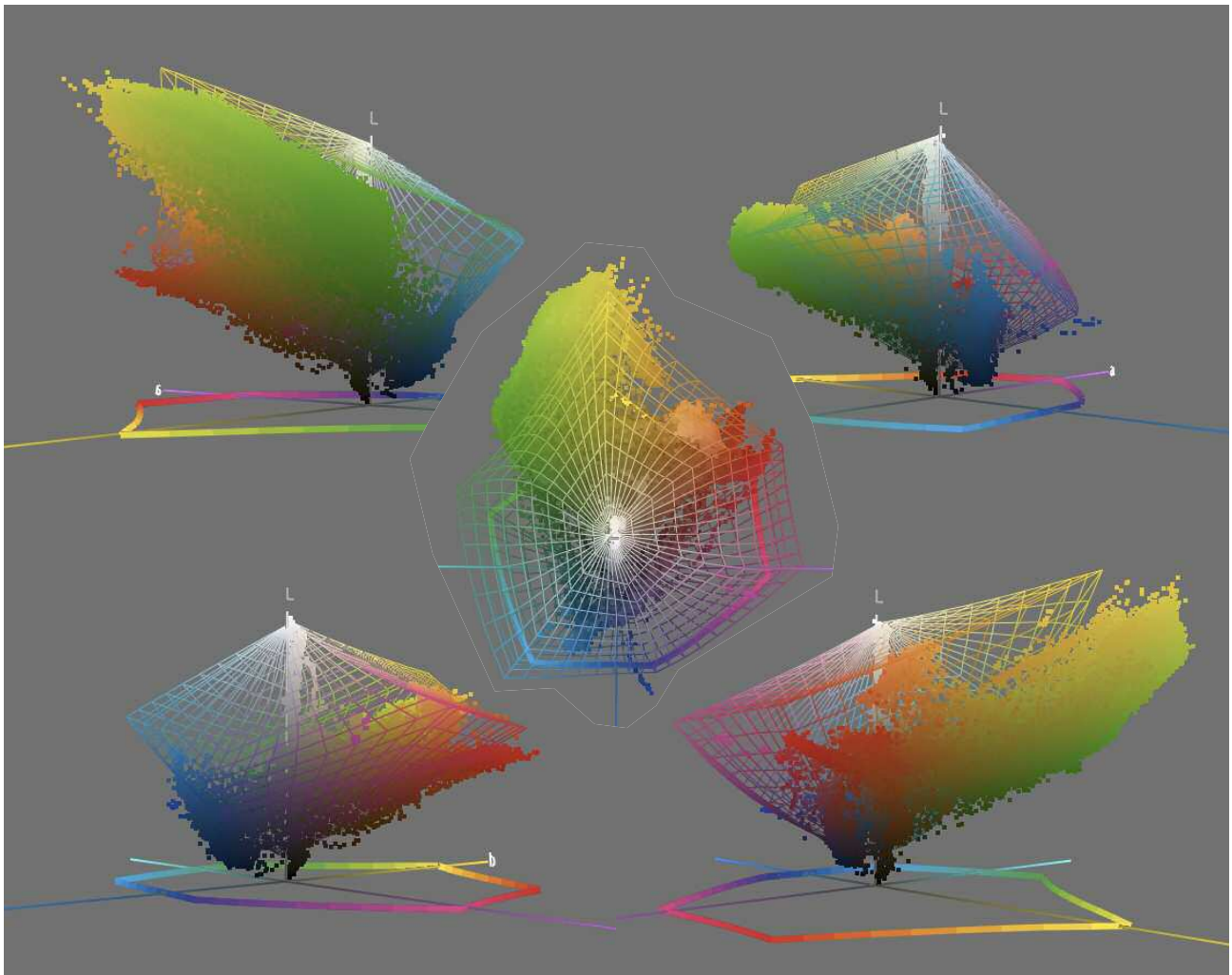
EIZO CG210 Monitor (wire frame) and out-of-gamut reflective subject

Many subjects contain colours that are out-of-gamut of the soft proofing monitor as well as the printing press. That is their colour range will exceed that of the monitor and the printing press, and many colours will be incapable of accurate reproduction on screen or in print. One solution is to work with inkjet prints (hard proofs) that accurately simulate the pre press gamut. The subject's gamut can then be sympathetically compressed in Photoshop into the output gamut of the press as verified by the inkjet proof prints.

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Adobe Studio Exchange
http://share.studio.adobe.com/   (for actions, scripts, plug ins etc)

Datacolor Spyder3Pro - Australian Distributor
http://www.kayellaustralia.com.au (Monitor Calibrator)

Lobster - Photoshop Separation Software
http://www.freegamma.com/

The Luminous Landscape
http://www.luminous-landscape.com/

Better Photoshop Techniques
http://www.betterphotoshoptechniques.com/

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