

Basic skills in the creation of a photomontage

This tutorial was developed with Photoshop 4 but the info remains useful for more recent versions.



The Black Art of Photo-Editing

While publishing on the desktop has become so mainstream that it is often difficult to remember the days of cut and paste, photo-editing has so far managed to maintain its mystery as a black art only to be practised by experts. For a while there were good reasons for this, but recent developments in software and processing power have changed the situation completely. In the professional repro house they are almost certainly using similar equipment and programs to those found in the office. Now there is no reason why the desktop user cannot at least explore the potential of professional photo-editing.

Of course many users will say that they already do use photo-editing software - that's how they scan in the graphics for the in-house newsletter or for their home page. In fact though they are almost certainly just scanning and saving, a hit-and-run approach that only scratches the surface of what can be achieved. This article is designed to show users both how to make the most of the photo-editing they already do and also to expand their horizons to see what they could be doing.

I'm going to take a typical real world example, the production of a photo montage, in this case of a proposed art gallery exhibition.

Broadly speaking the project is going to be divided into two stages. First the individual images will be prepared. This involves acquiring the graphics, either by scanning or from disk, and then making sure they are of the optimum quality by colour correcting and if necessary retouching. Then, when the individual images are ready, we will see how they can be creatively combined and controlled to produce the desired end result.

Compared to the computerised, artificial feel of drawn vector images the continuous tone end-results of photo-editing seem very natural, but the process that has created them is actually the most mathematical. That is why photo-editing benefits from as much RAM and processing power as can be thrown at it. To really get to grips with photo-editing it is important to remember - at least in the back of your mind - that to create the illusion of doodling with a paintbrush, behind the scenes the program is actually manipulating hundreds and often thousands of grid references and values.

Set Up

This knowledge immediately makes sense of the crucial concept of the "image modes" set when you create, or scan in, a new image. The image mode refers to the amount of information stored in each pixel. For a pure bitmap or black and white image, each pixel on the grid is either on or off (1 bit), for a grayscale image each pixel is one of 256 levels between pure white and pure black (8 bit), while for a full 16.7 million colour RGB image each pixel stores three values representing 256 levels of each of the primary colours Red, Green and Blue (24-bit). Your software and scanner might offer other intermediate options such as a cut-down 256 colour mode, but as this will offer no scope for future processing, stick to the main three.

As the number of potential colours of the image modes increases, so does the corresponding file size and necessary processing time. The skill is to keep both of these to a minimum while ensuring the optimum quality. To do this you should know at what size your image will be finally output and, for grayscale and full colour images, the screen frequency measured in lines per inch (lpi) of your outputting device. Typically these range from around 60lpi for a laser printer to around 150lpi for high quality phototypeset output. There is no point in having too much extra information that will not appear in the final

output so, for example, if your photo is to be output roughly size-for-size on a 133lpi phototypesetter it would make sense to scan in at 200dpi (dots per inch) which would still leave some room for flexibility.

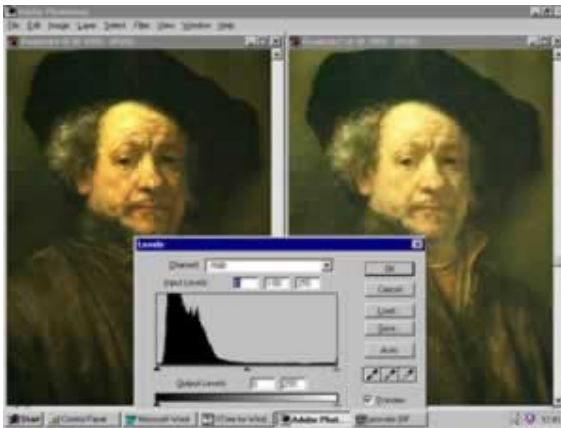
Also common nowadays is the use of stock photos from disk. For professional use these are likely to be supplied in PhotoCD format, and you can also have your own photos processed to this same format. PhotoCD images are supplied in various set resolutions on the disk and you should open the one most appropriate to your final output size and quality. If the image is still too large you can use Photoshop's Image Size command to resize it. For on-screen use, as for our project, it is possible to set the exact screen resolution. Photoshop is as intelligent as it can be during the resizing process, but inevitably some quality is lost and the process should only be used once.

Another increasingly common format for the supply of stock photographs is the highly compressed JPEG (*.JPG). This is where the majority of the images used in our project come from, thanks to the selection that comes with PhotoImpact - sadly Photoshop itself seems to be above such bundling. The problem with JPEGs is that they are a "lossy" format which means that each time they are saved some information is discarded to keep the file size down. Once opened therefore they, and all our other images, should be saved to a new format. We'll come to final image formats later but for now, as we intend to work further on them, we can save to Photoshop's own format *.PSD.

Now that we have acquired our images, the next step is to ensure that they are of the highest possible quality. Before we can do that, however, it is essential to ensure that the monitor has been calibrated correctly. This used to be a hideously complicated procedure involving external programs, but now the process is a simple, interactive walk-through procedure involving setting your white point and adjusting the gamma, colour balance, and black point. The necessary Monitor Setup command is available from the Colour Settings option under the File menu.

Global Colour Correction

Once we know that the on-screen colour is as true a reflection of the image on file as we can make it, we are ready to optimise it. Photoshop offers a whole raft of controls for globally manipulating the image's pixel data, all available from the Adjust option on the Image menu. The Brightness/Contrast command is probably the most obvious and most commonly used, but is a comparatively blunt instrument and is best avoided. Instead the first step should be to get an idea of the overall tonal map through the Levels command. This shows all the pixel data in the image as a histogram with the x-axis representing the colour values from the darkest to the lightest, and the y-axis representing the total number of pixels with that value.



The levels command calls up an editable image map showing the distribution of all pixel values in the current image.

For an image like the Rembrandt painting, or an underexposed photograph, all the values are concentrated to the left of the graph, while for an overexposed photo the reverse is true. Generally speaking, to have the values spread widely will give the greatest range and tonal depth. The beauty is that the histogram can be edited. It is possible to set the highlight, shadow and the midtone "gamma" and Photoshop will redistribute the current pixel values accordingly. In this way it is possible to correct exposure problems and even to bring out details that were not clear in the original.

The best results are usually obtained by stretching the current values

more equally across a wider tonal range and Photoshop offers the AutoLevels and Equalize commands to do this automatically. Both can be surprisingly effective, but for high quality work finer control is needed. This is offered by the Curves command which, although it does not show any information on the image's current values, allows the tonal range to be modified not just for the shadows, highlights and the mid tones, but for any point along the grayscale level.

When the tonal balance is set, it is time to adjust any colour imbalances. Often an image will seem to have a colour cast, to be too red or too yellow, for example. Our main image of the gallery, for example, is far too green and so very cold and uninviting. Using the Adjust Colour Balance command it is possible to change the RGB levels of all the pixels in the image. Lowering the amount of red, green or blue in the image is the equivalent of increasing the amount of cyan, magenta and yellow respectively. Finally, with the adjust Hue/Saturation command, it is possible to completely shift the overall - or even a particular - colour or to strengthen or desaturate colours that would otherwise be too muddy or too strong.



Our main gallery image has a cold and unwelcoming green colour cast. Using the Colour Balance command it is possible to make the image much warmer.

The final global correction that often needs to be made, particularly after scanning, is to tighten the focus of the image with a sharpening filter. All filters again do their work mathematically, altering the values of pixels depending on their current values and those of surrounding pixels. The various sharpen filters work by exaggerating the colour

changes between adjacent pixels. As this can lead to an unwanted granular effect, it is better to use the Sharpen Edges or more often the Unsharp Masking filters, which only apply the effect where there is already a significant colour change.

If you scan from halftoned printed material, rather than from a continuous tone photograph, you will often find an unpleasant moiré pattern in your image. You should probably treat this as a reminder that you do not have any rights to the image and find another, copyright-free source, but if you do continue you should reverse the sharpening process. Applying a Gaussian Blur will make the image less clear, but should help remove the patterned effect. If the effect is small the Despeckle filter might do the trick.

There's no time here to go into all the other filters available as Photoshop comes with over 90 and more can be bought in as add-ons (see boxout). The one point that remains true whatever the effect is that you should only ever use them for a reason as many of the filters, such as the numerous distortions, are driven more by maths than aesthetics. Some of the artistic effects on the other hand can be excellent ways of bringing to life an otherwise dull photograph of your head office or even partner.



Photoshop has over 90 different filters, many of which allow the automatic creation of artistic effects.

Local Editing / Retouching

So far we have looked at ways of enhancing the overall image through global changes to the entire bitmap. To change individual pixels, Photoshop's tools are brought into play. Most users are familiar with the brush tool for applying coloured strokes if only through memories of Windows Paintbrush. Although the principle remains the same, as you would expect with Photoshop, there are a number of enhancements. These are set with the Brushes and Brushes Options palette, accessed most simply by double clicking on the tool.

As well as choosing between different brush sizes and hardnesses, it is possible to set the opacity - or transparency - of the stroke. This is very significant as it means that the underlying image is not necessarily obliterated by the new colour. The other most important setting is the painting "mode". There are 14 possible options ranging from Normal through to Luminosity. Again each mode is based on a combination of an algorithm and the existing pixel values. For example with the Darken mode selected, the brush will only apply the new colour if it is darker than the current colour.

In fact painting with the brush plays a surprisingly small role when photo-editing. More common is the use of the various retouching tools, each of which works with the pixel information already there in the image. The Sharpen and Blur tools apply the same effects as the global filters while the Smudge tool acts like a finger smearing wet paint. The Dodge and Burn tools respectively lighten and darken the underlying pixels, while the Sponge tool is used to change their colour saturation.

One huge advantage computer-based editing offers over traditional photo retouching is the ability to clone, effectively painting with a copy of the existing image. This is done through setting a source by Alt + clicking and then painting with the Rubber Stamp tool. Exact replicas can be created to produce Anchor-butter-cow style effects, or more usually small imperfections can be quickly removed. For our project, the existing paintings on the gallery wall aren't eye-catching enough so I've cloned them out, painting over them with the surrounding wall.



One of the most useful retouching tools is the cloning tool which can be used to duplicate or remove existing elements.

Handling Selections

With global correction or local retouching we can work with the bitmap image as a whole or with individual pixels. In fact though, most images are made up of distinct and discrete objects so that a portrait, for example, will include a head, while a landscape is likely to include a sky or trees. Often it makes far more sense to work with these logical units, to sharpen the features of the face or to change the sky from sunny to lowering for example. To be able to work with these components of the image as units, they must first be selected. With a selection made, any editing only affects the selection.

The problem is that, to Photoshop, the image is nothing more than a grid of values. The program cannot see the objects that the eye can, so it is up to the user to create the selection. Photoshop offers a number of tools to help, but the process still represents the biggest hurdle for the occasional user to jump. For rectangular or oval objects, the marquee select tools are straightforward. For irregular but clearly defined objects, the lasso tool is used to create an outline. At all times it is possible to add to the selection by holding down the Shift key, or subtract from it by holding down the Alt key. To invert the selection or to remove it entirely, the commands from the Select menu must be used.

If the object is clearly marked by its colour it is possible to have Photoshop automatically make a selection, in our example, to isolate

the white statue from its blue background. Using the magic wand tool and clicking on a pixel automatically selects all the adjacent pixels that are of sufficiently similar colour. This colour "tolerance" is specified with the Brush Options palette. Selecting the Grow command will extend the selection to those pixels adjacent to the current selection that fall within the specified tolerance. Selecting the Similar command will select all such colours throughout the image. The Colour Range command allows a similar process to be applied interactively and precisely within an on-screen dialog.



Using the magic wand or the colour range command it is possible to make a selection based on colour similarity. Selections can then be stored as channels.

Using the colour selection tools will often select the majority of your intended object, but still leave holes or rough edges. This is where Photoshop's Quick Mask feature comes in. In Quick Mask mode, all unselected - and therefore protected - areas of the image are shown covered with a transparent ruby red mask. Using the brush tool set to either black or white it is possible to add to, or subtract from, this mask simply by painting. When you return to normal editing mode the unmasked areas become the new selection.

The other advantage of Quick Mask mode is that it is possible to create a grayscale rather than a solid selection. Any future editing will then depend on the opacity of the mask at that given point. For example with the gradient tool it would be possible to draw on a radial gradient mask centred on the face of a portrait and getting weaker towards the edges of a picture. You could then apply a blur

filter that would leave the face unaffected but produce an old-fashioned vignette effect towards the edge of the image.

Having gone to such effort to mark off a selection of an image, it's just as well that Photoshop allows them to be saved. With the Save Selection command the outline of the mask and any grayscale information is stored as an "alpha channel". Multiple selections can be saved and then brought back into play with the Load Selection command. To see the selections stored in an image you can call up the Channels palette, which also shows the individual Red, Green and Blue components of a colour image.

As well as being useful as masks to control editing and retouching, selections can be manipulated and transformed in a number of other ways. To begin with they can be cut, copied and pasted. If a selection is cut, it is automatically replaced by the current background colour which is the quickest way of filling a given area. If the selection is moved with the dedicated Move tool, it becomes a temporary floating selection, floating above the image below. To prevent obvious edges on copied selections it is possible to feather and anti-alias the selection's border which respectively blurs the transition and smooths out any potential jaggies.

It is also possible to transform a selection by resizing, rotating, skewing or applying a perspective effect. In the past these transformations used to be done individually with the separate Select menu commands, but in Photoshop 4.0 each option can be accessed by choosing the Free Transform command and then choosing from the right mouse button's shortcut menu. For example, to add the new artwork to the gallery, I was able to use the Free Transform command's Perspective option to align the pictures correctly with the walls (see walkthrough). Photoshop 4.0 does not implement any changes until all have been applied and the user has double-clicked within the selection, or pressed the Enter key.

Layers

By bringing external selections into our image we are moving into the

realms of photomontage and it is important to bring in a new concept; the layer. By directly pasting the new paintings onto the wall, the underlying pixel data would be changed irreversibly so that it would be impossible to simply reposition them. Instead Photoshop allows the selection to be kept on a separate layer above the image background. Each layer is like a transparent sheet of acetate stacked one on top of the other. Where there is nothing on the layer you can see any underlying layers and the underlying background image.



The advantages of layers are obvious. Each can be edited separately so that it is possible to scale, reposition, recolour and so on without affecting the rest of the image. The down sides are that each layer adds to the file size, slows down processing and brings in a whole new level of complexity. Even so for the professional user these are prices well worth paying as by copying a selection to its own layer, the flexibility and creative options on offer are instantly and dramatically increased.

Layers have become so integral to the photo-editing process that if you paste a selection into a background image in Photoshop 4.0 it is now automatically assigned to its own layer. The easiest way to create a layer is therefore to create a selection and copy and paste it. The new layer will automatically appear with a small thumbnail of its contents on the all-important Layers palette. The currently active layer is highlighted and it is crucial to understand that only this layer can be edited. If in future you find yourself unable to edit a section of your image, nine times out of ten it will be because this section is actually part of another, currently unselected, layer.

Once created, the control over layers are comprehensive. The stacking order of layers can be reordered simply by dragging up and down within the Layers palette. It is also possible to hide and reveal layers by clicking on the eye symbol in the leftmost column and to group layers by clicking in the second column. At the top of the palette are two important options that affect how the current layer interacts with the underlying image. Changing opacity affects the layer's transparency, while the mode options are identical to those available for the tools.



Typical examples of the use of layers would be for text and for shadow effects. Photoshop's control over text is very rudimentary and is only designed for adding the occasional word or phrase. Because text is now automatically added to its own layer, however, simply by changing the opacity or setting the mode to overlay, for example, some very striking effects can be achieved. Shadows can be created by duplicating a layer, distorting the selection, filling it with a gradient fill and then blending the shadow into the background image by setting the mode to multiply. By grouping the two layers, if the object is moved, its shadow will move with it.



By copying a selection to a layer, distorting it and applying a gradient fill, it is possible to create a realistic shadow.

Further control is offered by the use of layer masks. If the Add Layer Mask command is selected from the Layer menu an extra thumbnail appears to the right of the current layer in the palette. Alt + clicking on the thumbnail calls up the mask where it is possible to control which sections of the current layer are visible. This is where the use of graduated masks really comes into its own, creating subtle fade effects.

Adjustment Layers

Completely new in Photoshop 4.0 is the use of adjustment layers, added with the command under the Layers menu. These act like lenses applying any of the nine image adjustments such as curves, levels or hue/saturation to all underlying layers. The beauty is that each effect remains editable. If the effect is too strong, for example, the opacity can be lowered. Even better, by simply double clicking on the layer name, the relevant adjustment dialog can be called up again and new parameters defined.

As with layer masks, it is possible to paint on the adjustment layer to limit the effect to certain sections of the underlying image. In our gallery image, for example, I was able to add a hue/saturation adjustment mask. By selecting the walls, cutting and pasting them to the adjustment layer and then deleting them so that they are filled as

solid, the hue/saturation effect is limited to just this area of the image. It's a complicated procedure, but it means that at any time in future the colour of the walls can be changed by simply double-clicking on the adjustment layer and altering the hue.



By adding an adjustment layer with its own mask so that only the walls are affected, it is possible to recolour the wall to suit the pictures.

Photoshop's controls over the creation of photomontages are unrivalled and the only way to truly get to grips with them is to practice on your own projects. The main steps in the creation of the gallery image are outlined in the Putting It All Together box out and show the sort of effects that can be achieved. When you are finally happy with the image you have created the job is nearly over, but not quite. First the image must be output into a format that can be used by other programs. Our project, like a graphic intended for a home page, was only ever going to be seen on-screen, so the final step is to save it to a format such as a GIF or a JPG suitable for the Web (see Web box out).

RGB and CMYK

If you are intending to output your image from a DTP program, you will be better off saving to the industry-standard TIFF (Tagged Image File Format). If the final output of your image will be to your own desktop printer the default RGB TIFF will be fine. However, if your image is going to end up commercially printed and so output as colour separations, there is another stage to go through. Almost all

colour print is based on the CMYK (cyan, magenta, yellow and black) system, so you first have to convert your 24-bit RGB TIFF to a 32-bit CMYK format with the Image Mode command.

This conversion is not a simple one-to-one translation as the RGB and CMYK colour spaces are very different. In particular some colours are viewable on screen but cannot be printed. Photoshop can indicate these out of range colours throughout an image with the Gamut Warning option under the View menu, which then allows the hue/saturation to be massaged back into the CMYK gamut. Unfortunately that's not the end of the problems for the professional designer as the final output colour also depends on advanced factors such as dot gain and gray balance. Photoshop allows all of these parameters to be controlled precisely on the desktop, but as they depend on external factors such as paper stock, it is best to discuss the options with your printer and often preferable to leave the entire colour separation process to them.

Having done so much ourselves, it's a slight disappointment to have to say that any photo-editing process is still best left to the professionals. Even so we've managed to achieve a great deal from basic colour correction through to advanced photo-composition. Hopefully, next time you scan a photo you won't necessarily just save it and leave the program.

Tom Arah

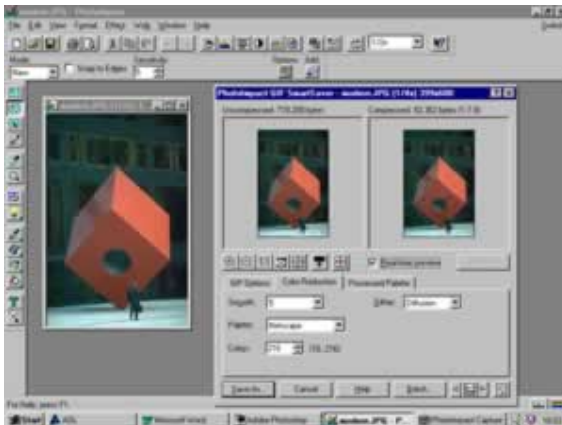
Working for the Web

One of the most important areas for the current graphic designer is the production of images for the Internet. Our final image, for example, could be destined to be part of a gallery home page where people could see and give feedback on the exhibition proposals. The actual process for producing the image is the same whether it is intended for on-screen or on-paper use. The only working difference is that, for the typical 72dpi of on-screen use, the images can generally be kept much smaller.

The real contrast comes when saving the file. The absolute prerequisite for Web images is that they should be kept as small as

possible to cut down on download time. For high quality, full colour work the best format is the JPEG (Joint Photographic Experts Group). Different levels of compression are available all of which discard some data considered non-essential. A new lossless, true colour format the PNG (Portable Network Graphics) is becoming increasingly popular on intranets and the wider Internet as browser support for it increases.

For the majority of images used on-screen, the full range of 16.7 million colours is a luxury that cannot be afforded. Instead the colour depth must be cut down by converting the image mode from RGB to Indexed colour. This offers the options to set the pixel depth from 3 to 8 bit and therefore the number of ultimate colours from 8 to 256. The latest Photoshop 4.0 also allows the palette to be kept to the 216 core colours viewable by all Web browsers without dithering. Once the colour depth has been changed the image can be saved to the standard GIF (Graphics Interchange Format).



Photoshop's handling and support for Web graphics is weak compared to that in the latest version of PhotoImpact.

Photoshop's Web support is functional, but hardly impressive. For a dedicated and integrated approach, the latest version 3.01 of PhotoImpact, provides a number of Web Extensions. These offer various controls such as frame, background and button designers, but it is the GIF and JPEG "Smartsaver" dialogs that really make the difference. To be able to change colour depth and compression settings and instantly see the effects on both image quality and file size is a breakthrough. Having used the Smartsavers, Photoshop's

trial-and-error approach seems like working half-blind.

Tom Arah

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Tom Arah