

# STEVE CAPLIN'S **A** TO **Z** OF DESIGN

## N: Noise reduction

Steve Caplin walks us alphabetically through the concepts essential to success for any jobbing or aspiring designer.



### ABOUT THE AUTHOR

**Steve Caplin** is a designer and illustrator working for a range of national newspapers. His best-selling *How to Cheat in Photoshop*, now in its fourth edition, is published by Focal Press.  
<http://books.macuser.co.uk/caplin>

**Noise is one of the biggest problems** with which designers and photographers have to contend. Easy to acquire and hard to get rid of, noise can render the best-composed images apparently unusable. However, there are ways of dealing with it, and the process involved depends on the kind of noise that's been produced.

Noise is caused by several factors. When taking photographs indoors without a flash, digital cameras have to work overtime in order to capture millions of pixels' worth of information in an under-lit scene. The most common result is colour noise – that is, the appearance of pixels of entirely the wrong colour cluttering up the scene. It could also be that the scene is simply too dark, and that noise appears as the equivalent of film grain in conventional cameras: using a high-ISO rated film may mean you'll be able to shoot with a fast shutter setting in dark conditions, but graininess will result. There's also moiré noise, which is generally caused by overlapping halftone screens when scanning printed images.

Here, we'll look at each noise type in turn and see how to deal with it.

### COLOUR NOISE

Colour noise is seen as a kaleidoscope of stray colour pixels, which is most noticeable in areas of deep shadow or in large, blank

areas such as walls. Most digital cameras produce colour noise, to a greater or lesser degree; the good news is that it's easy to fix.

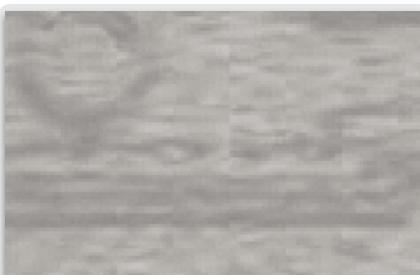
Images are generally captured in RGB mode, and in this mode it's hard to remove colour noise directly. The solution is to convert the image to Lab mode in Photoshop using Image > Mode > Lab Color. This changes the familiar red, green and blue channels into three elements: Lightness (a greyscale version of the image); and the two colour channels, a (red/green) and b (blue/yellow). Pressing command-1 will show the Lightness channel, while command-2 and command-3 will show a and b respectively.

The point of this conversion is that while in Lab mode, all the detail of the image is stored in the L channel, separate from the colour. This means you can apply loads of Gaussian Blur to the two colour channels, smearing all the stray colour pixels into each other without affecting the overall sharpness. Use command-~ (the tilde key) to view the composite image when you're done.

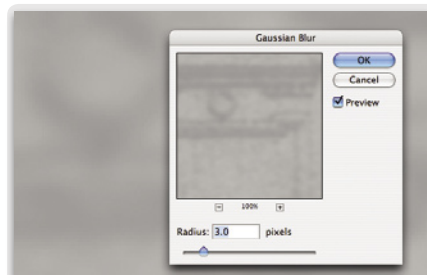
A slightly less successful but quicker alternative is to remain in RGB mode. Use enough Gaussian Blur so the colour variation disappears and then press command-shift-F to bring up the Fade dialog. Change the mode of the last-used filter to Color, and the sharpness will be retained.



▲ **DOOR 01** A close-up of a photograph of a door. The colour noise is clearly visible here.



▲ **DOOR 02** Converted to Lab mode, this is the b channel: a fair amount of variation is visible.



▲ **DOOR 03** Applying a 3.0 pixel Gaussian Blur to this channel smooths out all the colour variation.



▲ **DOOR 04** When we now view the composite image, the colour noise has gone.



▲ **PUB 01:** A very noisy shot of a pub interior, taken in low light conditions.



▲ **PUB 02** Gaussian Blur removes the noise, but makes the whole image look out of focus.



▲ **PUB 03** The Median filter removes the noise, while keeping the sharp edges within the image.

## IMAGE NOISE

Very noisy images, usually the result of high exposure settings, affect the grey component as well as the colour values – known as Speckle, or Salt and Pepper noise. The conversion to Lab colour space won't help here – more drastic measures are needed.

The most obvious way to remove noise is to blur the image using Gaussian Blur. This does work to an extent, but at a cost: the whole image will become fuzzy and out of focus. A better solution is to use the Median filter (Filters > Noise > Median), which operates in a similar way to Gaussian Blur, but with the added feature of recognising boundaries within the image and keeping them sharp. At high values, the Median filter will inevitably reduce sharpness in the image to some degree. For most cases, though, a value of just 1 or 2 is sufficient to create a dramatic improvement.

The best solution of all is to avoid noise in the first place. If you know you're going to be shooting images indoors without a flash, take a tripod and use your camera's manual override settings to allow for a longer

exposure time, which will give the camera a better opportunity to capture the scene at a more leisurely pace.

## MOIRÉ PATTERNS

Moiré noise is produced by two overlapping screens at different angles; the two arrays of dots combine to create strong patterns where the dots coincide. You'll generally see this noise when scanning photographs from a book or magazine, as a halftone screen will already have been applied to the image before being printed. When the regular grid of pixels is overlaid on this image, it will interfere with the printed dot to create an unwanted rosette effect.

It's almost impossible to get rid of moiré patterns, although the Median filter can help to some degree. However, it's possible to minimise the appearance of the patterns when scanning.

The angle at which a screened image is scanned will have a strong effect on the strength of the resulting pattern; the size of the halftone dot in relation to the pixel size will also make a difference. So in the first instance, try scanning at a different

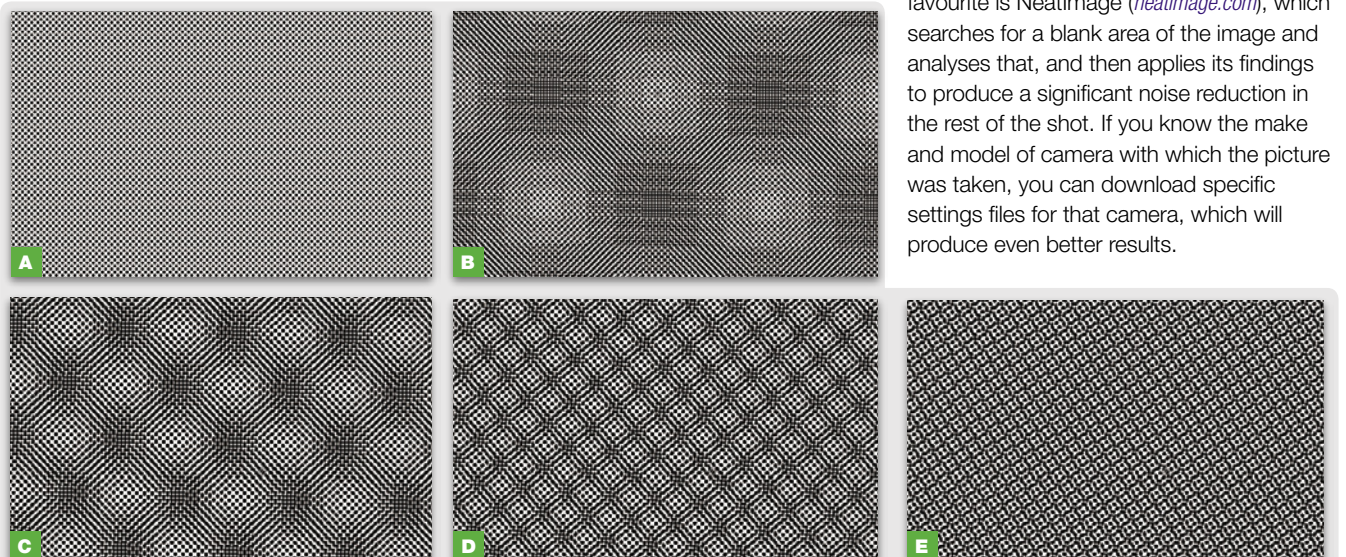
resolution. For images printed at high quality in glossy magazines, increasing the resolution can help a lot.

Second, try rotating the image in the scanner. Even changing the scanning angle by one or two degrees can help significantly, as the moiré pattern is most evident when the two screens are closest to each other. Experiment with different angles to see what produces the best results.

## AUTOMATED NOISE REMOVAL

Recent versions of Photoshop have a filter dedicated to removing noise, which you can find in Filters > Noise > Reduce Noise. This will make a fair stab at removing both image and colour noise, and can also compensate to some degree towards removing Jpeg artefacts (the blockiness caused by over-enthusiastic Jpeg compression, usually produced by cheaper digital cameras). This filter won't produce perfect results, but it can make a significant improvement: choose Advanced settings to control each of the Lab colour channels independently.

A better solution still is to use third-party software. There are several products; our favourite is NeatImage ([neatimage.com](http://neatimage.com)), which searches for a blank area of the image and analyses that, and then applies its findings to produce a significant noise reduction in the rest of the shot. If you know the make and model of camera with which the picture was taken, you can download specific settings files for that camera, which will produce even better results.



▲ **Moiré** Two copies of an array of dots overlaid on top of each other (A). When we change the angle to 1.5° (B), 4° (C), 10° (D) and 22.5° (E) we can see how the moiré pattern produced by coinciding dots varies tremendously with the angle.