

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

## U: Unsharp Mask

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>

**Unsharp Mask is a filter that's routinely** applied to images to increase the contrast between regions of differing luminosity. But despite the fact that the filter has only three controls, its use is confusing to many designers. Even the name is baffling: how can a technique used to sharpen images possibly be described as 'unsharpening'?

The answer to the name issue lies in the origins of the technique. It dates from the 1930s when photographers would overlay a blurred positive of an image on top of the original negative. This 'unsharpened mask' would hide some of the detail in the negative, combining with the original to create a sharper print.

The digital process works in much the same way. It first applies Gaussian Blur to a copy of the image, and examines the difference between the two. This difference is then subtracted from the original, so that

the remaining area – in other words, the disparity between the sharp and blurred regions – can be strengthened.

So much for the theory. In practice, the Unsharp Mask filter has three controls: Amount, Radius and Threshold. Each of these makes a difference to the way that an image is enhanced and since to some extent the Threshold slider appears to cancel out the operation of the other two, it's important to understand just how individually they affect the finished result.

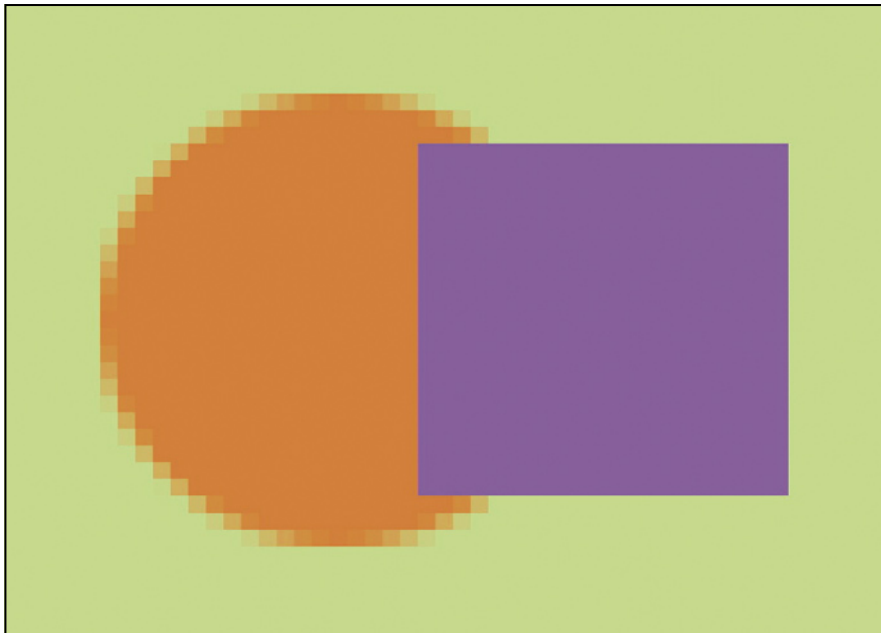
The Amount slider is a percentage – which rather confusingly ranges between 0% and 500%. It adds contrast to edge regions, effectively strengthening the boundaries between light and dark areas, but exerts little or no effect on smooth, similar tones. Where a light region borders a dark one, the light side will be brightened and the dark side darkened.

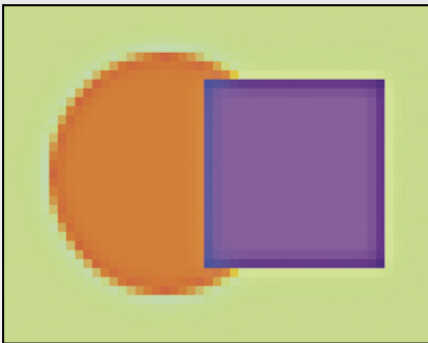
The Radius slider varies from 0 to 250 pixels. This controls the width of the border around edge regions upon which the sharpening action has its effect. The size of the Radius setting determines the size of the detail in the image that receives the sharpening process. As the Radius is increased, a visible halo begins to appear around contrasted areas, and so it's usual to apply a Radius setting of about 1 pixel to begin with, increasing it as required. The Radius can be increased in steps of 0.1 pixels, giving a lot of user control.

The Threshold slider is the one that causes the most confusion. This determines how different contrasting borders have to be from each other for the filter to operate on them. The higher the value, the more difference is needed before any effect is seen.

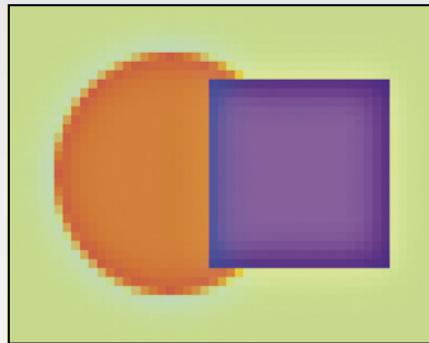
Although the Threshold slider appears to reduce the overall effect, it actually serves to limit the effect to those regions that need it the most – the true borders between light

▼ 01 A greatly enlarged image before an Unsharp Mask filter is brought into play (sequence continues top right).

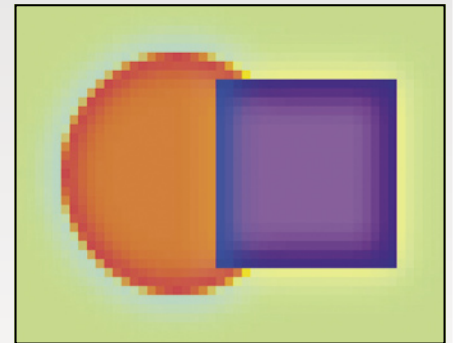




▲ 02 When we add an Unsharp Mask filter, using an Amount of 100% and a Radius of 1 pixel, the two geometric shapes have darkened interior edges, and the background is correspondingly brightened outside them.



▲ 03 Raising the Radius to 2 pixels doubles the width of these brightened and darkened areas, increasing the area used to display contrast between the shapes and the background.



▲ 04 By raising the Amount to 200%, a much stronger effect is produced. You'll note that this operation has increased the contrast, while leaving the Radius (the thickness of the rim) untouched.

and dark areas. By raising the Threshold value by one or two levels we can avoid sharpening smoother areas and so prevent the speckling effect seen when regions such as skin and sky are oversharpened.

In practice it's best to start with low values for all the sliders – an Amount of 50%, a Radius of 1 pixel, and a Threshold value of 0. Raise the Amount while looking at the preview image to see the effect it's having but for general purposes keep it below 200%. You should rarely need to raise the Radius value above 2 pixels as an absolute maximum. If noticeable noise is creeping into smooth, toned regions, raise the Threshold value to 1 or 2 until this disappears (see our example, right).

Although it's a very powerful and useful filter, Unsharp Mask is not without its pitfalls. Zealous over-sharpening can produce severe degradation in the image that's difficult to get rid of later: err on the conservative side when applying it.

If you're producing items for the Internet be aware that sharpened images will produce much larger file sizes, which will slow the delivery of your website. This is because Jpeg compression works best with soft images: the higher the amount of contrast between border regions, the less compression the Jpeg algorithm will be able to apply. When working for low-quality print such as newspapers, it's worth adding more sharpening than you'd normally use, to compensate for the lack of focus caused by printing ink bleeding into the coarse paper.

An unwanted side effect of applying Unsharp Mask is so-called colour fringing, in which halos of unnatural colour appear around the edges of objects. This tends to happen with high degrees of sharpening but can be visible even with low amounts on areas of differing colour contrast. A photo of a green tree against a blue sky, for

example, may well produce such an unwanted halving effect.

One solution is to convert the image to Lab colour mode, using Image > Mode menu. Lab space is a way of describing colour using a Luminosity channel (which holds a greyscale version of the image) and

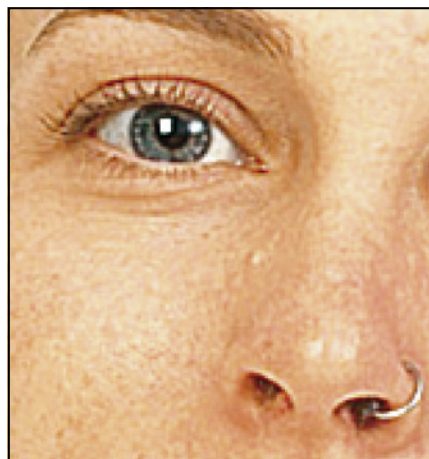
two colour channels, labelled a and b. By applying the Unsharp Mask filter to just the Luminosity channel we can produce a strong sharpening effect without the risk of the operation affecting the colour components. After applying the filter, you can return the image to its original RGB colour space.



▲ 05 In this real-life example, our enlarged close-up of an eye and nose shows a soft image that's sorely in need of sharpening.



▲ 06 Applying an Amount of 100% and a Radius of 1 pixel produces a clearer eye and nose ring, with well-defined lashes.



▲ 07 We can increase the Amount to 150%, producing stronger contrast in the eye. But now the skin tones have taken on some unwanted sharpening, producing a strong speckling effect.



▲ 08 By raising the Threshold value we can prevent the filter from having any effect on the skin region, while still producing strong sharpening where we want it – with the eye and nose ring.