Figure 2.15 PSNR examples: (a) original; (b) 30.6 dB; (c) 28.3 dB

Figure 2.16 Image with blurred background (PSNR = 27.7 dB)

processing systems rely heavily on so-called objective (algorithmic) quality measures. The most widely used measure is Peak Signal to Noise Ratio (PSNR) but the limitations of this metric have led to many efforts to develop more sophisticated measures that approximate the response of 'real' human observers.

2.6.2.1 PSNR

Peak Signal to Noise Ratio (PSNR) (Equation 2.7) is measured on a logarithmic scale and depends on the mean squared error (MSE) of between an original and an impaired image or video frame, relative to $(2^n - 1)^2$ (the square of the highest-possible signal value in the image, where n is the number of bits per image sample).

$$PSNR_{dB} = 10 \log_{10} \frac{(2^n - 1)^2}{MSE} \qquad (2.7)$$

PSNR can be calculated easily and quickly and is therefore a very popular quality measure, widely used to compare the 'quality' of compressed and decompressed video images. Figure 2.15 shows a close-up of 3 images: the first image (a) is the original and (b) and (c) are degraded (blurred) versions of the original image. Image (b) has a measured PSNR of 30.6 dB whilst image (c) has a PSNR of 28.3 dB (reflecting the poorer image quality).