

# Fourier statistics of fruit in foliage – a match with human contrast sensitivity?

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The human visual system encodes luminance as a Fourier band-pass function and chrominance as a low-pass function. It is tempting to think that this imbalance reflects a property of the natural world. However, it has been found that there is no such difference between the Fourier luminance and chrominance spectra of a wide variety of natural scenes. If a main task of the chromatic channels is to encode information about fruit in foliage, we asked whether the Fourier properties of such scenes are different from the set of images analysed earlier. We therefore obtained 91 digital images of fruit, and other scenes, using a custom-calibrated digital camera. We analysed these scenes to obtain their luminance and red - green chrominance spectra. The results indicate that scenes containing fruit and foliage have power spectra which are more in keeping with human contrast sensitivity. Chrominance images of these scenes have steeper spectral slopes than luminance images. This is particularly the case when the red fruit occupies more than 10% of the total area of the image, corresponding to relatively close-up viewing. These results suggest that the spatio-chromatic properties of human vision optimise the neural representation of scenes containing fruit and leaves.