

# Perceived contrast of natural images is mediated by higher-order image statistics

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Previous research (Párraga et al, 2000 *Current Biology* 10 35 - 38) has indicated that human vision is optimised for processing the information in natural visual images. We defined 'natural' as having a normal value of the slope of the Fourier amplitude spectrum (the  $1/f$  slope). The task used was the discrimination of objects subtly varying in shape. The results suggested (a) that object discrimination was optimal for natural values of slope; and (b) that a simple model, based on contrast discrimination mediated by local spatial-frequency detecting units, successfully predicted object discrimination performance.

We now ask how this may relate to the perception of overall image contrast. For a variety of natural images, we varied the spectral slope and found that, in general, maximal contrast (as indicated by a matching task), occurs for natural values of spectral slope. This remains the case even when the natural slope deviates from the common value of around -1.2. However, this peak in perceived contrast for natural slopes is removed by phase-scrambling the image. Since this destroys higher-order statistics, while leaving the Fourier spectrum unchanged, we conclude that perceived contrast is mediated by higher-order statistics of images.

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