

A multi-resolution colour vision model for human chromatic and achromatic local-contrast discrimination

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We have previously shown how a simple (low-level), physiologically plausible model of achromatic local-contrast discrimination predicts human performance for discriminating between pairs of slightly different morphed pictures (Párraga et al, 2000 *Current Biology* **10** 35 - 38). The model does a multi-resolution analysis of the two pictures and detects differences in local contrast in each spatial frequency channel. For the present work, we have developed a dichromatic version of the same basic model, which analyses separately the achromatic and chromatic (red - green) representations of pairs of colour images and simply signals which representation produces the largest contrast difference. This limited version of the model is valid only for foveal detection tasks (given the lack of blue cones in the central fovea), and we expect to develop a full-colour version in the near future. To relate model output values to actual human discrimination thresholds, we calibrated the model against a series of psychophysical experiments where human observers' discrimination thresholds were measured for 49 sequences of slightly different morphed images of fruits (Párraga et al, 2003 *Perception* **32** Supplement, 168). The model was tested by correlating subjects' detection performance in an experiment which involved detecting coloured targets with predictions of the model.

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