Modelling red-green and blue-yellow colour vision

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The performance of human observers at discriminating between pairs of slightly different achromatic morphed images has been modelled by a simple (low-level) multiresolution model (PÃ¡rraga, et al, 2000 Current Biology 10 35 - 38). The model takes two slightly different pictures as input, analyses them in terms of the spatial information content at different resolution levels, and returns a measure of discriminability. We have expanded this model to work on full chromatic images by separating the stimuli into three physiologically meaningful 'channels' according to the McLeod - Boynton colour space and performing the multiresolution analysis in each channel separately. The model determines which of three channels gives the biggest discriminability measure. To relate the output values of the model to actual human discrimination thresholds we made two series of sequences of slightly different images of fruits (Párraga et al, 2003 Perception 32 Supplement, 168) that were designed to vary in shape, texture, and colour. The first series of stimuli varied their colour along the red - green axis (Párraga et al, 2004 Perception 33 Supplement, 118) and the second series varied along the blue - yellow axis to allow the two colour 'channels' of our model to be assessed independently. Once calibrated against psychophysical data from three observers, the colour model was tested against various results involving detection of coloured road and railways signs, fruit, etc.