A demonstration of ‘void’ colours and ‘natural’ colours

BY S. ZEKI. Department of Anatomy, University College London, London WC1E 6BT

This demonstration was given to provide a better understanding of the correlation (or its absence) between perceived colours and the responses of single colour coded and wavelength-selective cells in monkey visual cortex (Zeki, 1982a, b; 1983). It is derived from Land’s (1974) retinex experiments.

A multicoloured display was illuminated with three 350 W Kodak Carousel projectors, each equipped with an interference filter (bandwidths at half heights of 8–10 nm), one passing light of 630 nm (long wave), the other light of 530 nm (middle wave) and the third light of 470 nm (short wave). When a given area of the display, say the green, is illuminated in isolation (by excluding everything else from the field of view) with 60, 30, and 10 mW. Sr–1. m–2 of long-, middle- and short-wave light, it appears light grey. This constitutes its void colour at these reflected energies. When, without changing the above energies, the rest of the display is brought into the field of view, the area turns green. This is its natural colour. Returning to the void mode, if the amount of long-wave light is increased to 80 mW. Sr–1. m–2, without adjustment of the intensities of middle- and short-wave light, the void colour will be a pale orange. When the rest of the display is brought into the field of view, without changing the reflected energies (natural mode), the natural colour will be perceived as green. Similar results are obtained with areas of other colour.

The demonstration thus shows (a) that there is a correlation between the void colours of an area and the wavelength composition of the light reflected from it and (b) that there is no fixed relationship between the natural colour of an area and the wavelength composition of the light reflected from it.

REFERENCES