Investigative Ophthalmology & Visual Science , 1992, vol 33, No. 4, p 701

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THE ORGANIZING POWER OF COLOUR SIGNALS

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One of the functions of colour vision is to impose organization on the visual field: elements that are similar in chromaticity will tend to be linked. But our trichromatic colour vision depends on two subsystems - a phylogenetically older system that compares the signals of the short-wave cones with some combination of the signals of long- and middle-wave cones, and a phylogenetically recent system that compares the signals of the long- and middle-wave cones. These two subsystems (S and L/M) correspond to the two dimensions of the MacLeod-Boynton chromaticity space and to the cardinal directions of Krauskopf, Williams and Heeley. But what is their relative power to impose organization on the visual field?

We prepared a display in which the organization indicated by the S axis is pitted against the organisation suggested by the L/M axis. A regular array of small discs is displayed on a computer-controlled raster display. On each trial, we impose on alternate *columns* of discs a certain modulation along one dimension of colour space, while simultaneously the chromaticity of alternate *rows* is modulated in the other dimension of colour space. The observer must indicate whether he perceives a vertical or a horizontal organization of the array. By adaptively adjusting the size of the excursions along the two chromaticity axes and randomly assigning S and L/M to vertical and horizontal organizations, we can determine the modulations that are of equal salience for the purposes of perceptual segregation. The luminance of individual discs was randomized.

The relative salience of the two colour signals was found to depend systematically on the spatial separation of adjacent discs: the relative salience of the S signal increased as the separation of the elements increased.