cular occlusion (48 hr) exhibited effects similar to those just described for long-term deprivation. In all cases response reductions were more moderate than would be expected from the losses found by study of single cells in area 17. However, single-cell study of area 18 indicated that a significant cortical input from the deprived eye was present in accord with the findings from visually evoked potential measurements. The origin of this input remains to be determined.

REFERENCE


The response of colour-specific cells in monkey visual cortex to colours produced by shadows

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If a screen is illuminated by two projectors, one of which has a red filter in the light path while light from the other is unfiltered (white), and if an object is placed in the light path, its shadow on the screen will appear bluish-green. If a green filter is exchanged for the red, the shadow will appear red. This phenomenon of ‘coloured shadows’, first described by von Guericke (1672, see Land, 1980) and by many others since, is a simple example of the more general phenomenon of coloured images produced by binary systems, as demonstrated, for example, in Land’s ‘red and white projections’ (Land, 1959, 1980). Would cortical colour-coded cells respond to colours produced in this way? To answer this, single cells were isolated in the fourth visual areas (V4) (Zeki, 1973) of monkeys anaesthetized with Nembutal and paralysed with Flaxedil, their colour specificities determined and their receptive fields plotted. Here I describe three categories of colour-coded cells, all of them binocularly driven and with relatively large receptive fields (average 4° × 3-5°). When routinely tested, one category gave an ‘on’ response to green and an ‘off’ response to red; another responded to green only, other colours being ineffective; and a third gave an ‘on’ response to red and an ‘off’ response to green. Coloured shadows were produced by inserting narrow-band interference filters in one projector and using unfiltered light produced by a tungsten filament bulb (colour temperature 3300 °K – attenuated, if needed, by neutral density filters) from the other. Cardboards were placed in the light path such that their shadows were of the size of the receptive field. Green ‘on’ – red ‘off’ cells gave an ‘on’ response to a green shadow produced by red and white light and an ‘off’ response to a red shadow produced by green and white light. Red ‘on’ – green ‘off’ cells also responded to the appropriate colours produced by shadows. Finally, cells responsive to green only gave a brisk discharge to greens produced by shadows.

The proportion of colour-coded cells that would respond to their specific colours when the latter are produced, not by spectral lights, but by shadows from lights which show no trace of that colour perceptually, is not known. But the presence of such cells in the fourth visual areas of monkey cortex was an exciting observation.

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Vernier acuity in monocularly deprived humans
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Physiological and anatomical studies in monkey have shown that monocular deprivation results in an expanded area of visual cortex receiving input from the non-deprived eye (Hubel, Wiesel & LeVay, 1977). It is possible that the additional pathways available to the non-deprived eye may result in improved visual performance. We have investigated this possibility in human subjects who had long standing monocular deprivation. Tests of a sensitive visual function, vernier acuity,

![Fig. 1. Results are shown for measurements of vernier acuity in subjects with long-standing functionally monocular vision and normal binocular subjects. Frequency-of-seeding data were determined at two displacements and by interpolation, 75% correct levels were derived and used as threshold values. Open and closed circles represent data from the deprived and non-deprived eyes, respectively, of the functionally monocular subjects. Triangles represent data from normal binocular subjects. Arrows indicate means of each group.](image)

were conducted monocularly and results were compared with monocular measurements from normal binocular subjects. The mean vernier displacement value was significantly lower (i.e. sensitivity was higher) in the functionally monocular subjects. Measurements were also made from some functionally monocular subjects of contrast sensitivities for sinusoidal gratings of various spatial frequencies. Vernier acuities of the deprived eyes, when measurable, were relatively more reduced than cut-off frequency estimates of grating acuities. However, there was a loose correlation between the degree of vernier deficit and that of contrast sensitivity.

REFERENCE