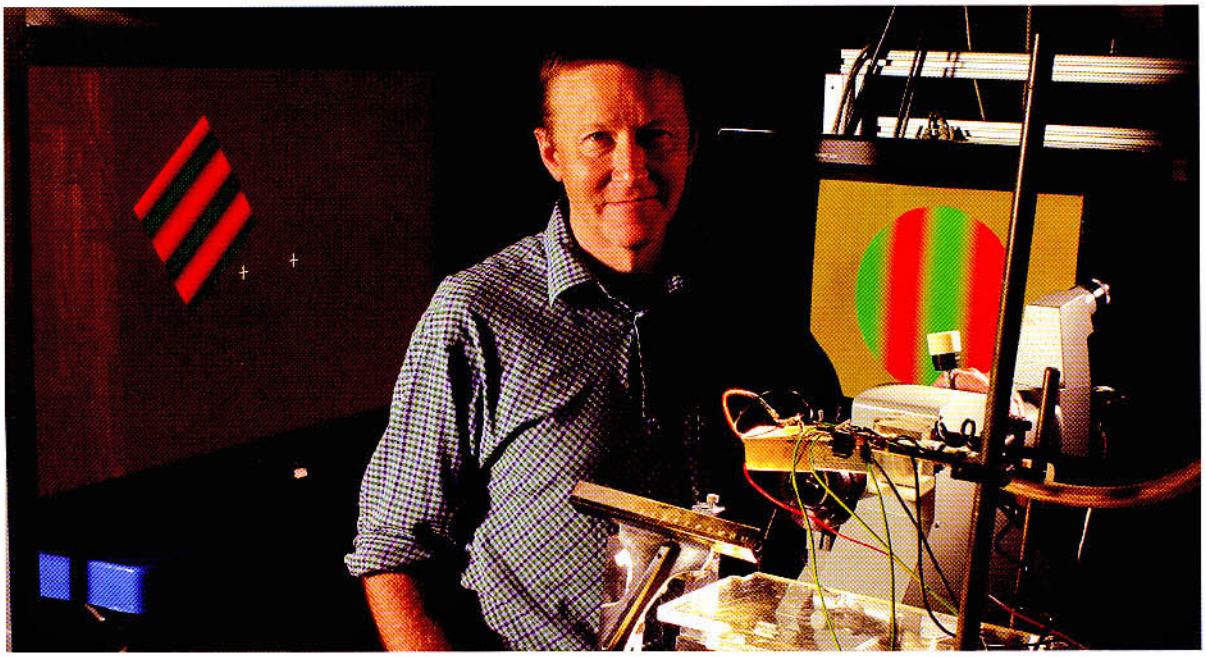
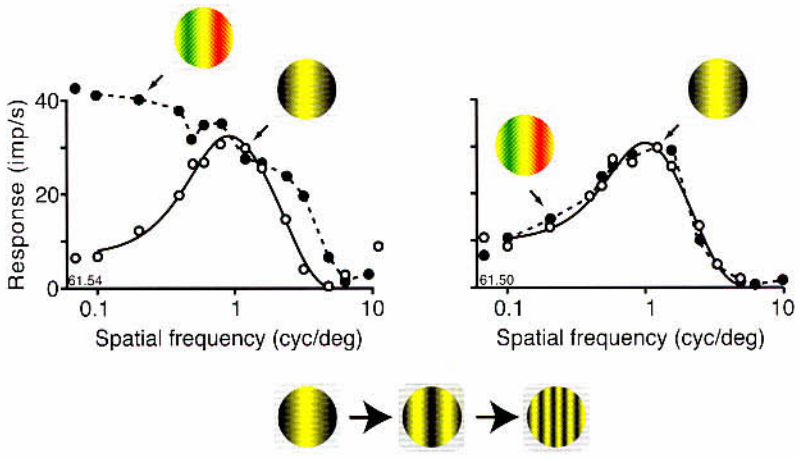
Colour and spatial selectivity of ganglion cells

Paul Martin, Samuel Solomon, Barry Lee



Ganglion cells are the output nerve cells (neurones) of the retina. They carry signals about the colour, form and motion of objects in the world from the eye to the brain. In order to understand the code by which these signals are transmitted, we record the signals ("action potentials") in the eye and as they pass through the brain.

Properties of ganglion cells in the primate retina are analysed by measuring the response to simple stimuli such as coloured gratings. The spatial frequency of the grating is varied in order to measure the spatial selectivity (acuity) of the ganglion cell. The figure shows data from a collaborative project with Professor Barry Lee from the SUNY College of Optometry in New York and Samuel Solomon (*NHMRC C.J.Martin Fellow*). Responses of two ganglion cells are shown; although they both have similar spatial acuity for luminance modulation, only one shows selectivity for colour (red-green modulation) and the response is limited to low spatial frequencies. We discovered that even in the peripheral retina, some ganglion cells remain chromatically selective. These experiments can lead to improved understanding of the variation in colour vision capacity across the visual field.



Responses of two ganglion cells to luminance and chromatic variation. The small patches show the stimulus configuration. The spatial frequency is systematically increased as indicated at the bottom of the graphs. Low spatial frequencies generate a colour selective response in one of the cells (left).