

Erratum

The Spatial Frequency Sensitivity of Bipolar Cells

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Abstract. Retinal bipolar cells constitute the output stage of the outer layer of the retina. There are several constraints on the ability of the bipolar cell array to respond to the different spatial frequency components of the visual image, including (i) electrical coupling in the photoreceptor layer; (ii) the finite size of the bipolar dendritic tree receiving receptor input; (iii) the “lateral inhibition” mediated by horizontal cells. Using simple mathematical models, we derive analytical expressions

for the spatial frequency response of the bipolar cell array for the case in which horizontal cells are presynaptic to bipolar cells (feedforward model) and also for the case in which horizontal cells are presynaptic to receptors (feedback model). The results illustrate the importance of the three factors mentioned in determining the bipolar cells’ properties. The optimal spatial frequency for stimulating the bipolar cell array, and the range of spatial frequencies transmitted onward to the inner plexiform layer, are thus related to the anatomical and electrical properties of the cells in the outer plexiform layer.