

研究论文

抑制性整合野细胞的对比度响应函数研究

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摘要:

采用细胞外记录的方法,在单独刺激经典感受野(classical receptive field,CRF)或同时刺激CRF和感受野外区域(extra-receptive field,ERF)的情况下,测量了猫初级视觉皮层细胞的对比度响应函数。当刺激所用的中心和外周运动光栅的参数一致时,与仅刺激CRF相比,强的ERF抑制使对比度响应函数动态区增加,响应增益和对比度增益降低。当中心和外周光栅的方位相差90度时,与方位参数一致的情况相比,大部分细胞的ERF抑制减弱,对比度响应函数的动态区减小,对比度增益和响应增益增加;少数细胞的ERF对CRF的作用从抑制变为易化,其对比度响应函数的动态区与只刺激CRF相比还要小,而对比度增益和响应增益还要大。揭示了初级视觉皮层细胞的抑制型整合野在CRF和ERF图像的方位及对比度差异检测中的作用机制。

关键词: 经典感受野 感受野外区域 整合指数 对比度响应函数 对比度增益

The Contrast Response Function of the Inhibitory Extra-Receptive Field Cells

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Abstract:

Using extracellular recording methods, the authors measured the contrast response function of the inhibitory extra-receptive field of 41 cells in the cat primary visual cortex, when stimulating the classical receptive field(CRF) only or simultaneously stimulating CRF and extra-receptive field (ERF). The results showed that a large contrast stimulus with the preferred orientation that covered ERF and CRF resulted in the increment in dynamic range of contrast response function and the decrement in contrast gain and response gain. However, the discontinuity between CRF and ERF in stimulation orientation largely removed the inhibitory effects of ERF of some cells, and resulted in the increment of the dynamic range of the contrast response function and increment of contrast gain and response gain.

Keywords: Classical receptive field Extra-receptive field Summation index Contrast response function Contrast gain

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