

猫前内侧上雪氏区视神经元对运动随机线条的反应

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对于运动信息在脑内的加工,一种观点认为分两阶段进行,低级视皮层只对运动图形内部成分的取向进行调谐,高级视皮层整合低级视皮层的输入,对图形整体的运动方向敏感。用网格(plaid)作为刺激的实验表明,在较低级皮层区,细胞多表现为成分方向选择性(Component-motionSelectivity),即对刺激中的取向因素敏感;而较高级视皮层的细胞多表现为整体方向选择性(Pattern-motionSelectivity),对运动整体的方向敏感,从而支持运动信息加工的“两阶段”理论。实验中,用一系列运动随机线条刺激(randomlinepatterns),研究猫前内侧上雪氏区(Anteromediallateralasuprasylvianarea, AMLS)神经元的方向调谐特性,结果表明多数细胞为整体方向选择性,且随线长增加此类细胞比例下降,而成分方向选择性细胞的比例有所增加,呈现由整体方向选择性向中间类型(Unclassified),由中间类型向成分方向选择性变化的趋势,提示整体或成分方向选择性可能并非细胞的固有特性,而是可以随刺激取向因素的变化而改变的。

THE RESPONSIVE CHARACTER TO MOVING RANDOM-LINE STIMULI OF CAT'S AMLS AREA NEURONS

A widely accepted theory for visual motion processing in the cortex consists of two stages: the primary visual cortex tunes to the direction of motion of oriented components of a complex stimuli and the outputs are integrated at higher visual areas, in which neurons are sensitive to the moving direction of the whole pattern. Neurophysiological studies using plaid as the stimulus have shown that in the primary cortex and lateral suprasylvian area (LS) of the cat neurons are selective to the orientation of the component grating rather than to the true direction of the drifting plaid, therefore termed component-motion selectivity (CM) cells, while in a extrastriate cortical area, the MST of the monkey, neurons are tuned to the motion direction of the whole pattern, and termed pattern-motion selective (PM) cells. The present study, using a series of moving random-line patterns as the stimuli, showed that more than half neurons studied in AMLS area exhibited PM-like tunings. Moreover the percentage of PM-like tunings gradually decreased with the increment of the length of the component line segments of the stimulus pattern, accordingly the percentage of CM-like tunings increased. These results may imply that PM- or CM- selectivity is not a fixed property for certain cells, alternatively, the directional tuning of the neurons can vary with the orientation element in stimuli.

关键词

运动知觉(Motion perception); 随机线条(Random line); 方向选择性(Direction tuning); 前内侧上雪氏区(AMLS); 猫(Cat)