

形状识别的功能定位和时间过程:功能磁共振与脑电结合的研究

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通过结合具有高空间分辨率的功能磁共振成像(fMRI)和具有高时间分辨率的128导脑电事件相关电位(ERP)两项技术,测量了视皮层腹侧区域对图形形状识别任务反应的空间定位和时间过程。fMRI的实验结果表明,图形的形状知觉引起了腹侧GTi/GF皮层区域的兴奋。进一步,基于fMRI兴奋区域的种子偶极子模型拟合的ERP动态定位分析和自由运动的偶极子模型拟合的ERP定位分析结果表明:GTi/GF区域活动的时间发生在刺激呈现之后132-176ms时间段,峰值150 ms左右,相应于ERP的N1成分。这些结果在人类大脑皮层上同时确定了视觉通路中涉及图形形状识别的兴奋区域和兴奋的时间过程。

COMBINED SPATIAL AND TEMPORAL IMAGING OF FORM PERCEPTION: AN fMRI + ERP STUDY

The present study integrated functional magnetic resonance imaging (fMRI) and event-related potentials (ERP) to identify and characterize the spatio-temporal pattern of brain activation at the ventral visual pathway areas underlying form discrimination. The fMRI results indicated significant activation in the ventral areas GTi/GF (the inferior temporal gyrus/the fusiform gyrus). The convergent results derived from the source analysis of fMRI-seeded and moving dipole modeling and from the source waveforms of fixed dipole modeling consistently suggested that the fMRI activation foci GTi/GF were the major source localization of the N1 component and were activated during the time window of 132-176ms with peak latency at about 150ms. These findings provided multi-methodological evidence for the brain activation pattern of form perception in terms of both functional localization and time dependence.

关键词

形状知觉(Form discrimination); 功能磁共振成像(Functional MRI); 事件相关电位(ERP); 功能磁共振与事件相关电位结合(Integration of fMRI and ERP)