

第十六章 社会注意中面孔朝向 与眼睛注视线索的表征

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Abstract: Social attention is a special attention with strong ecological and social meaning. The cues of social attention include face view, gaze direction and body orientation. They are represented in the human visual system with specialized neurons. With electrophysiological technologies, psychophysical adaptation paradigms and brain imaging technologies, we can deeply investigate the neural encoding and decoding mechanisms of social attention. Converging evidence shows that face views may be represented in FFA and STS while gaze direction may be represented only in STS. These representations are partly independent and partly interacting with each other. fMRI adaption and multi-voxel pattern analysis are two quickly developing technologies in social attention researches.

Key words: Social Attention, Face View, Gaze Direction, Adaptation, MVPA

三、使用 fMRI 适应技术研究社会注意线索的编码

前面已经提到过，在神经元水平，如果在短时间内给神经元呈现两个相同的刺激，神经元对第二个刺激的放电会显著地降低。这一现象已经在电生理的实验中得到证实 (Li et al., 1993)。研究者们将其命名为重复抑制或者适应现象。那么，是否只有当刺激完全相同的时候才能产生适应的效果呢？答案是否定的。这取决于神经元对刺激的敏感性。单个神经元往往只对刺激的某个特征敏感。例如，初级视觉皮层中有对刺激朝向敏感的神经元，意思就是说该神经元只对某个朝向的线条刺激有最大的反应，一旦刺激朝向偏离这个偏好朝向，神经元的发放就会显著降低。但是，由于一个视觉刺激有很多特征，如何说明适应的发生是因为神经元对某特征的敏感造成的呢？在一般的实验中，都设置两种条件

- Calder, A. J., Jenkins, R., Cassel, A., Clifford, C. W. G., 2008, Visual representation of eye gaze is coded by a nonopponent multichannel system. *Journal of Experimental Psychology: General*, 137: 244-261.
- De Souza, W. C., Eifuku, S., Tamura, R., Nishijo, H., Ono, T., 2005, Differential characteristics of face neuron responses within the anterior superior temporal sulcus of macaques. *Journal of Neurophysiology*, 94: 1252-1266.
- Fang, F., He, S., 2005, Viewer-centered object representation in the human visual system revealed by viewpoint aftereffect. *Neuron*, 45: 793-800.
- Fang, F., Murray, S. O., He, S., 2007, Duration-dependent fMRI adaptation and distributed viewer-centered face representation in human visual cortex. *Cerebral Cortex*, 17: 1402-1411.
- Grill-Spector, K., Henson, R., Martin, A., 2006, Repetition and the brain: neural models of stimulus-specific effects. *Trends in Neural Science*, 10: 14-23.
- Haxby, J. V., Gobbini, M. I., Furey, M. L., Ishai, A., Schouten, J. L., 2001, Distributed and overlapping representations of faces and objects in ventral temporal cortex. *Science*, 239: 2425-2430.
- Jenkins, R., Beaver, J. D., Calder, A. J., 2006, I thought you were looking at me: direction-specific aftereffects in gaze perception. *Psychological Science*, 17: 506-513.
- Li, L., Miller, E. K., Desimone, R., 1993, The representation of stimulus familiarity in anterior inferior temporal cortex. *Journal of Neurophysiology*, 69: 1918-1929.
- Nummenmaa, L., Calder, A. J., 2009, Neural mechanisms of social attention. *Trends in Neural Science*, 13: 135-143.
- Perrett, D. I., Smith, P. A., Potter, D. D., Mistlin, A. J., Head, A. S., Milner, A. D., Jeeves, M. A., 1985, Visual cells in the temporal cortex sensitive to face view and gaze direction. *Proceedings of the Royal Society of London. Series B, Biological Sciences*, 293-317.
- Schweinberger, S. R., Kloth, N., Jenkins, R., 2007, Are you looking at me? Neural correlates of gaze adaptation. *Neuroreport*, 18: 693-696.