

MODULATION OF FREE VIEWING AND SACCADDES ON VISUAL CORTEX

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In visual science research, awake animals traditionally are required to perform simple fixation tasks. Fixation can indeed simplify the situation because the spatial relationship between the visual objects and the retina is unchanged, and no obvious eye movement is made. But in real life, animals are freely viewing, and their center of gaze continually jumps. Studies suggest that the visual system might use a different information-processing pattern under natural viewing conditions. Here with optical imaging of intrinsic signals, we studied neural activity of macaque V1, V2 and V4 under fixation, free viewing and guided saccades conditions. We found: (1) that compared with fixation, functional domain distribution remained unchanged in V1, V2 and V4 during free viewing and guided saccades; (2) that neural activity in visual cortical areas V1, V2 and V4 was suppressed under guided saccades, compared with both fixation and free viewing. Another phenomenon we observed was that optical imaging signal during the beginning one to two seconds after the stimulus onset was affected by neither stimulus presentation nor eye movement, but very possibly the animal's expectation. These findings suggest avenues for future research though the mechanisms for these three phenomena are unclear.

Key Words: Free Viewing, Saccade, Optical Imaging, Functional Domain, Time Course, Expectation.

Approved by Professor Anna Roe