Presentation Abstract

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Presentation Title: Influence of serotonin on the orientation tuning curves in V1 of cats following adaptation

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Authors: L. BACHATENE\(^1\), S. SHUMIKHINA\(^1\), J. ROUAT\(^2\), *S. MOLOTCHNIKOFF\(^1\); \(^1\)Univ. of Montreal, Montreal, QC, Canada; \(^2\)Dept. of electrical and computer engineering, Univ. of Sherbrooke, Sherbrooke, QC, Canada

Abstract: Recently it has been shown that adapting neurons of primary visual area to nonpreferred stimuli (orientation and spatial frequency) for several minutes shifts the peak of tuning curves in the direction of the adapter (Neuroscience 2009 & 2011). This attractive shift is recorded in about two thirds of cells. Repulsive shifts (away from the adapter) are less frequent after such long duration adaptation. Consequently neurons acquire new optimal properties. Furthermore after recovery from this initial adaptation, second adaptation 90 to 120 minutes later results in an amplification of the effects obtained following the first adaptation (shifts and response magnitude increase). The gain following the second adaptation suggests that the adapter left a memory trace. The present experiments were aimed at investigating the influence of serotonin (Sigma) on cellular responses prior to and following adaptation. Adult anaesthetized cats were prepared in the conventional fashion for recording electrical activity of cortical neurons (area V1). Three to four electrodes were lowered into V1. Serotonin (12% solution) was applied locally. A custom-cut paper filter (1x1mm) soaked in the serotonin solution was placed on the cortical surface, surrounding the site of electrode penetration. Preliminary data seem to show that local infusion of serotonin affects cellular responses in two ways. First, cellular firing rates diminished (mostly responses around the optimal orientation, while spontaneous and flank discharges were less affected) suggesting the presence and activation of type 5-HT1 receptors. Second, serotonin changed adaptation; an attractive shift without serotonin became a repulsive shift with the
drug. This latter result agrees with our published data showing that repulsive shifts are the consequence of a default process due to response decline at the adapter orientation. Our data, although preliminary, indicate that serotonin influences tuning curve fluctuations following adaptation.

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