

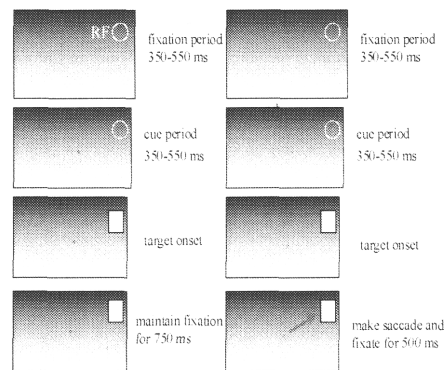
Behavioral Relevance Influences LGN Neurons of Macaque Monkey in the Absence of Receptive Field Stimulation

Introduction

Visual information towards the primary visual cortex (V1) has to pass the lateral geniculate nucleus (LGN). Since the LGN receives a number of non-retinal inputs it is likely that the LGN regulates the signals sent to cortex based upon the information it receives from these other inputs. There is good evidence, e.g. that the transfer of visual information to cortex is significantly altered when an animal is asleep in comparison to when an animal is awake. This study was designed to examine if LGN cells carry information about either task demands or behavioral relevance.

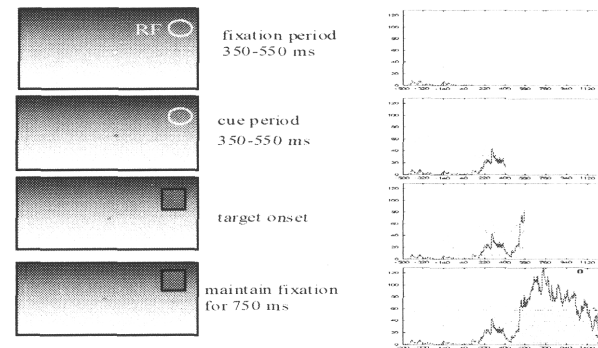
Methods

A bonnet macaque (*Macaca radiata*) was trained to perform one "NO-GO" and two "GO" tasks while single cell activity was recorded from the LGN. In NO-GO tasks the monkey was required to maintain fixation while in the GO tasks the monkey was required to make a saccade to a target stimulus presented on a computer screen. Eye movements were monitored. the animal worked for reward.

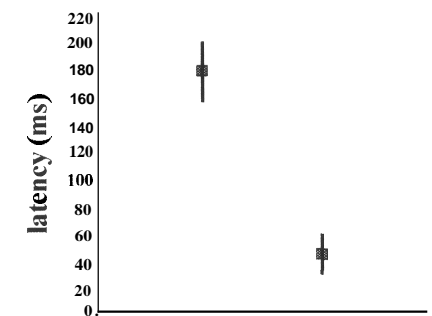


Presentation of the cue influences LCN activity prior to target onset

A significant ($p \leq 0.05$) change in activity was found in about half of the 131 cells in the waiting period following cue onset and prior to target onset (figure below). This "pretarget" modulation on average caused a 27% increase or 15% decrease in the baseline activity.



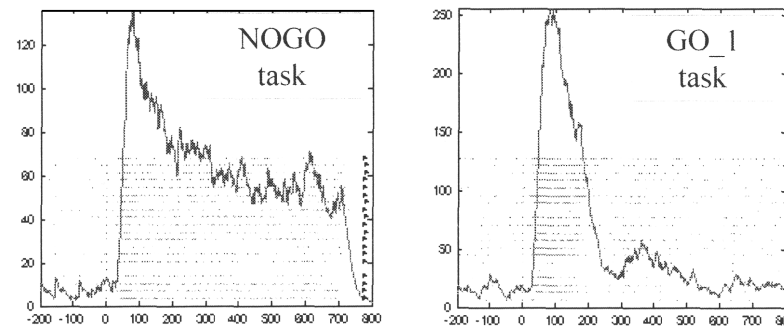
Latency values of the pretarget activity are longer than the latency to target onset (40 ± 4.3 SE ms and 178 ± 6.9 SE ms).



Conclusions

Task requirements influence response to the target

Response levels were higher in those tasks where the receptive field was stimulated AND the target had behavioral significance, i.e. the monkey had to make a saccade to the target. Target was presented at time "0".



1. Fixation cues indicating task requirements modulate the activity of LCN cells prior to target onset.
2. The pretarget activity arises from an extraretinal source since the latency to the onset of pretarget activity is significantly longer than the latency to onset of activity to the target itself and the LGN receptive fields on average were well beyond the fovea (about 8.0° eccentric).
3. LGN cell responses to a target presented in the receptive field also are significantly greater if the monkey plans to make a saccade to the target.