

## Behavioral relevance influences LGN neurons of macaque monkey in the absence of receptive field stimulation

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### Abstract

**Purpose:** How early in the visual pathway does neural activity reflect task relevance? In this study we asked whether neurons in the lateral geniculate nucleus (LGN) are modulated by task demands.

**Methods:** A macaque monkey was trained to perform a "NO-GO" and two "GO" tasks. Standard procedures were used to collect single neuron activity in the LGN during the tasks. After mapping the receptive field of an LGN neuron the monkey was required to fixate a central spot for at least for 1000 ms. Color change of the fixation spot indicated whether the monkey was to remain fixated (NO-GO) or make a saccade (GO) to a target presented either inside or outside the receptive field, or to one of two targets presented both inside and outside the receptive field. Targets were presented 500 ms after the change. On GO trials the monkey was rewarded for making a saccade to the target within 500 ms remaining within the target for 500 ms. On NO-GO trials reward was given after 1000 ms. Results: 31 LGN cells were recorded. 31 showed significant modulation after the color change of the fixation spot before target onset during both GO and NO-GO trials. This pre-target modulation averaged 30% above baseline. In two thirds of the cells we observed an increase, in the rest a decrease in activity. The latency of the onset of the pre-target modulation was significantly longer than the latency of response to the target in the cell's receptive field. (181ms vs. 49ms; t test,  $p < 0.05$ ). **Conclusions:** We propose that the pre-target modulation results from feedback to the LGN since the neuronal activity changes before the target appeared, and the latency of this modulation was much longer than the latency to the target itself. We conclude that a proportion of "P" cells in the macaque LGN can code both behavioral relevance and stimulus attributes.

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