



Report

Texture effects on the responses of lateral geniculate neurons

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Texture effects on the responses of lateral geniculate neurons

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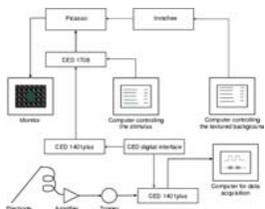
Institute of Neuroinformatics, ETH and University of Zürich

I. Introduction

Long range interactions have been demonstrated at different levels of the visual system [1,2,3,4]. This work proposes to study them in the lateral geniculate nucleus (LGN) of the cat, using a moving large textured backgrounds and stimuli on the classical receptive field (CRF).

II. Methods

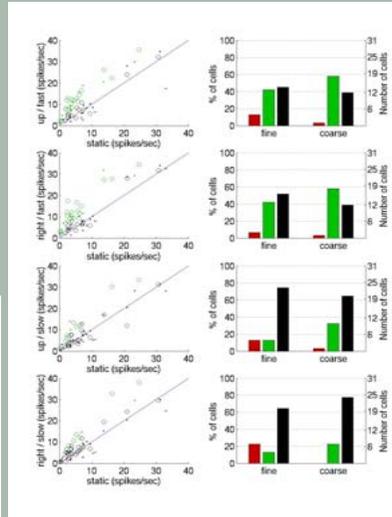
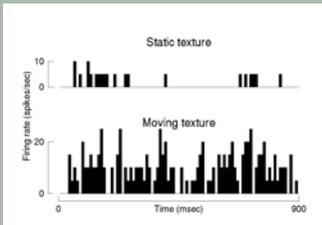
Single cells were recorded from the LGN of anaesthetised, paralysed cats. Three different stimuli (flashed spots, moving bars, and counterphased gratings) were shown on the receptive field centre of LGN cells. These stimuli were superimposed to moving textured backgrounds composed of random dots.



III. Results

1. Texture alone

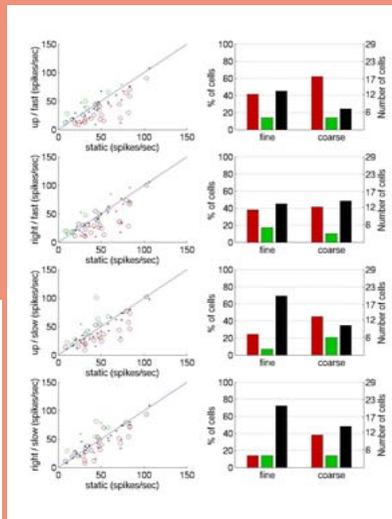
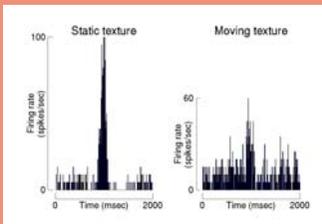
The majority of the cells responded to the textured background moving alone on the whole field. The cells were driven by local changes in contrast, not by the motion itself.



2. Texture + stimulus

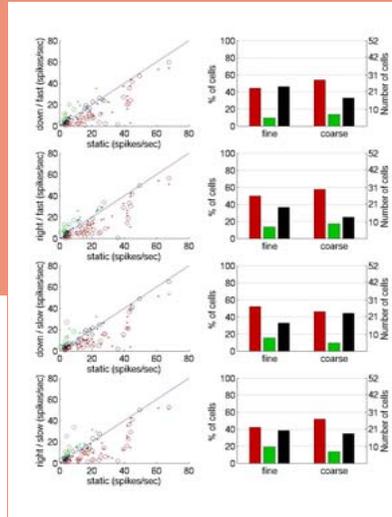
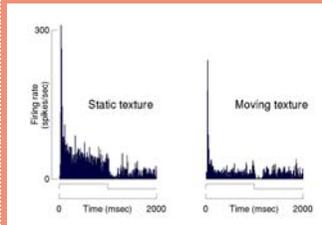
2.1 Moving bar

The response to a moving bar crossing the receptive field was suppressed when the texture moved relative to the response while the texture was static.



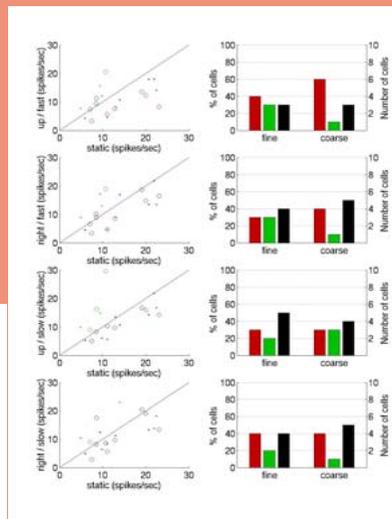
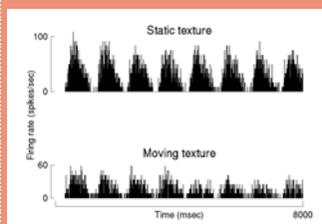
2.2 Flashed spot

The response to a spot flashed on the receptive field center were suppressed in the majority of the cells while the textured background moved. Some cells were even almost completely suppressed. The transient (peak) and the sustained part of the response were suppressed.



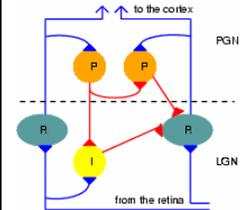
2.3 Counterphased grating

A counterphased sine wave grating placed on the receptive field center was also presented in the presence of the moving texture. In this case also the response were generally smaller when the texture moved.



IV. Discussion

The effect observed might come from the perigeniculate nucleus (PGN). One PGN neuron receives inputs from many LGN cells [5, 6] and thus has a large receptive field [7, 8]. It contacts to LGN neurons back through inhibitory synapses over a large area.



V. Conclusion

Long range interactions act at the LGN level. The different cell types are similarly affected. There are no large differences according to the texture velocity or direction. The observed effect might be a gain control of the LGN output signal.

VI. References

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VII Acknowledgements