UNIFORM FAN-OUT CONSTRAINTS COUPLE ORIENTATION AND RETINOTOPIC DISTORTION MAPS

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Introduction
Das and Gilbert observed correlated displacements of orientation and retinotopy in cat V1. We demonstrate how coupling between the orientation and retinotopic maps could arise from a simple geometric constraint: uniform fanout.

Uniform Fanout is Not Compatible with Uniform Retinotopy and an Orientation Map. We assume convergence fields are Gaussians elongated in a direction corresponding to the preferred orientation.

Uniform Fanout may be Restored by Introducing Distorted Topography

Methods

Conclusions

Geometric Constraints Make Uniform Retinotopy Incompatible with Uniform Fanout and Elongated Receptive Fields.
Retinotopic Distortion can Restore Uniform Fanout
Retinotopic Distortion is Larger where the Orientation Map Changes more Rapidly.

Predictions

Retinotopic Distortion is Larger around “+” Pinwheels than around “-” Pinwheels.
Retinotopic Distortion has a Stereotyped Shape at either “+” Pinwheels or “-” Pinwheels.