CDB SEMINAR

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The Scripps Research Institute, USA

Thursday, December 4, 2014

16:00~17:00 A7F Seminar Room

Spatial-Temporal-Spatial transformation in visual map plasticity: A novel rule in input dependent organization of circuit

Summary

To generate an accurate visual perception of our surroundings, animals must "tune" neural connections from the retina to the brain in order to compensate for various noise, such as optical errors in eyes, natural variance in neural structures, and developmental disorders. A prime target for the tuning process is retinotopy, the projection of axons from the retina to the brain. While retinotopy is initially mapped by molecular cues, the projection pattern of axons can be further tuned through visual experience. By imaging retinal axon projection while exposing *Xenopus* tadpoles to various visual stimuli, I show that this tuning mechanism exploits relationships between the spatial order in the vision and the temporal order of input in the optic flow generated by the animal's forward-directed locomotion. The predominant anterior to posterior optic flow activates retinal ganglion cells in a stereotyped sequence. This temporal sequence driven by natural optic flow refined retinotopy by regulating axon arbor branch dynamics, whereas the opposite sequence of retinal activity prevented map refinement. Our study shows that sensory projection strategy takes advantage of the intrinsic bias in the way that animal receives information of its surroundings. This organizational principle likely applies to other sensory modalities and projections in the brain.

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