Vision for predation and predator evasion

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Abstract:

I will discuss ongoing work on the specialized pathways in the retina and brain that serve two essential visual survival behaviors: predation and predator evasion.

For predation, I will explore how a cell-type-specific acute zone of retinal ganglion cells establishes a specialized sensory filter optimized for dynamic prey tracking. We will examine how this discrete retinal channel projects to the superior colliculus, and how downstream circuits decode these signals to construct a distance-selective, three-dimensional action volume essential for precise prey capture.

For predator evasion, I will focus on the retinal circuits that detect approaching threats and assess their danger levels. I will detail how distinct dendritic computations within a critical amacrine cell type extract behaviorally relevant looming feature. By investigating specific inhibitory mechanisms at the subcellular level, we will see how these local processes tune the receptive fields of downstream targets, ultimately controlling the sensitivity and execution of looming-evoked escape behaviors.

Together, these systems highlight how specialized retinal channels and collicular networks construct distinct sensorimotor filters to execute complementary three-dimensional survival actions.