Sensorimotor control and decision making during Drosophila chemotaxis

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Behavioral strategies employed for chemotaxis have been studied across phyla, but the neural computations underlying odor-guided behaviors remain poorly understood. By combining electrophysiology, quantitative behavioral analysis and computational modeling, we explore how dynamical olfactory signals experienced during unconstrained motion are processed by the peripheral olfactory system of the *Drosophila* larva. We exploit virtual olfactory environments created based on optogenetics to study how this information is converted into elementary orientation decisions. Our work clarifies the link between neural computations at the sensory periphery and the emergence of action selection enabling larvae to navigate noisy odor gradients.