Seminar/Talk

Rheotaxis in Larval Zebrafish

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Host: Maximilian Jösch

When flying or swimming, animals must adjust their own movement to compensate for displacements induced by the flow of the surrounding air or water. Although flow-induced displacements can be detected by the visual system as changes within the animal s frame of reference, passive drift in dark environments would occur in the absence of sensory information. In spite of this, many aquatic animals will consistently orient and swim against oncoming flows (a behavior known as rheotaxis) even in the absence of visual cues. How animals achieve this task, and its underlying sensory basis, is still unknown. In this talk, I will show how larval zebrafish (Danio rerio) perform rheotaxis by using flow velocity gradients as navigational cues. I will present behavioral data that support a novel algorithm based on such local velocity gradients, that fish use to efficiently avoid getting dragged by flowing water. Specifically, I will show that fish use their mechanosensory lateral line to first sense the curl (or vorticity) of the local velocity vector field to detect the presence of flow and, second, measure its temporal change following swim bouts to deduce flow direction. The implications of this rheotactic algorithm for systems neuroscience, behavioral ecology and robotic design will also be discussed.

Friday, April 21, 2017 10:30am - 11:30am

Mondi Seminar Room 1, Central Building

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