

LadHyX Seminar – February 16, 10:45 – LadHyX library

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A fish with legs and alternation strategies for navigating turbulence

Sea robins are fishes with sensory appendages (“legs”) that they use to walk and to dig live prey from within the substrate. Their preadation strategy is so effective that they are often followed by other fish trying to steal their prey. I will discuss a set of behavioral experiments suggesting that these animals take advantage of sensory information from the water column as well as on sand. This “alternating” behavior, sampling sensory cues on substrates vs in the bulk of fluids, is well documented in rodents and dogs, suggesting that animals integrate both fluid-borne and substrate cues into a multi-modal navigation strategy. What dictates alternation between these two sensorimotor modalities in the context of olfactory navigation? I will switch from experiments to theory and show approximately optimal search strategies obtained through machine learning techniques. I will show that efficient searchers do indeed alternate between sampling the substrate and the bulk. Far from the target, the searcher is most likely to rely on bulk odors as the search is information limited. The exact moment when the searcher switches between substrate and bulk is dictated by a marginality condition that stems from an emergent cast-and-surge behavior that optimal searchers undertake.