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Infomechanical specializations for prey capture in knifefish[1] MALCOLM MACIVER, NEELESH PATANKAR, OSCAR CURET, ANUP SHIRGAONKAR, Northwestern University — How does an animal's mechanics and its information acquisition system work together to solve crucial behavioral tasks? We examine this question for the black ghost weakly electric knifefish (*Apteronotus albifrons*), which is a leading model system for the study of sensory processing in vertebrates. These animals hunt at night by detecting perturbations of a self-generated electric field caused by prey. While the fish searches for prey, it pitches at $\approx 30^\circ$. Fully resolved Navier-Stokes simulations of their swimming, which occurs through undulations of a long ribbon-like fin along the bottom edge of the body, indicates that this configuration enables maximal thrust while minimizing pitch moment. However, pitching the body also increases drag. Our analysis of the sensory volume for detection of prey shows this volume to be similar to a cylinder around the body. Thus, pitching the body enables a greater swept volume of scanned fluid. Examining the mechanical and information acquisition demands on the animal in this task gives insight into how these sometimes conflicting demands are resolved.

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