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Conflicts between sensory performance and locomotion in weakly electric fish[1] MALCOLM MACIVER, ANUP SHIRGAONKAR, NEELESH PATANKAR, Northwestern University — The knifefish *Apteronotus albifrons* hunts for small water insects at night using a self-generated electric field to perceive its world. Using this unique sensory adaptation, the fish senses prey that are near its body with a detection volume that approximates a cylinder that has a length ten times its radius, similar to the fish's elongated body plan. If the fish swims straight, then the back portion of the actively generated detection volume is scanning fluid already scanned by the front portion, but the energy expended to overcome drag is minimized. If it swims with the body pitched, then the rate of volume scanned for prey is increased, but the energy needed to overcome body drag is also increased. In this work we examine the compromise the fish makes between minimizing energy in overcoming drag and maximizing scan rate. We use computational fluid dynamics simulations to assess the impact of changes in body pitch angle on drag, and computational neuroscience simulations to assess the shape and size of the prey detection volume and how body angle changes the scan volume rate.

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