

Abstract Submitted
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Tiger beetle's pursuit of prey depends on distance ROBERT NOEST, JANE WANG, Cornell University — Tiger beetles are fast predators capable of chasing prey under closed-loop visual guidance. We investigated their control system using high-speed digital recordings of beetles chasing a moving prey dummy in a laboratory arena. Analysis reveals that the beetle uses a proportional control law in which the angular position of the prey relative to the beetle's body axis drives the beetle's angular velocity with a delay of about 28 ms. The system gain is shown to depend on the beetle-prey distance in a pattern indicating three hunting phases over the observed distance domain. We show that to explain this behavior the tiger beetle must be capable of visually determining the distance to its target and using that to adapt the gain in its proportional control law. We will end with a discussion on the possible methods for distance detection by the tiger beetle and focus on two of them. Motion parallax, using the natural head sway induced by the walking gait of the tiger beetle, is shown to have insufficient distance range. However elevation in the field of vision, using the angle with respect to the horizon at which a target is observed, has a much larger distance range and is a prime candidate for the mechanism of visual distance detection in the tiger beetle.

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