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Poster title: Towards guidance laws that govern visual pursuit in mice

Abstract: Mice have poor vision, yet much of their food comes highly motile insects in the wild. While there has been much interest in hunting in mice, a basic description of hunting pursuit has not been made. Here we describe hunting pursuit as a parametric guidance law model, and relate this guidance law to multiunit brain activity. We found that of two common guidance laws, parallel navigation and proportional pursuit, parallel navigation best fits the behavior. How a sight-limited animal implements such a strategy necessitated an investigation into how behavioral variables relevant to hunting were represented in the brain. We investigated the superior (SC) due to its dual role as sensory and motor region. We found rich representations of the hunt in SC through multilayer Neuropixel probe recordings. Linear decoding yielded accurate reconstructions of such variables as distance, ground speed and turning speed in a state-dependent manner. These results indicate SC as a promising avenue for understanding complex and naturalistic sensorimotor behaviors such as hunting, and that there are state-dependent representational shifts in SC.