

Molecular physiological study on the operating principles of a prototype neural circuit model for behavioral optimization

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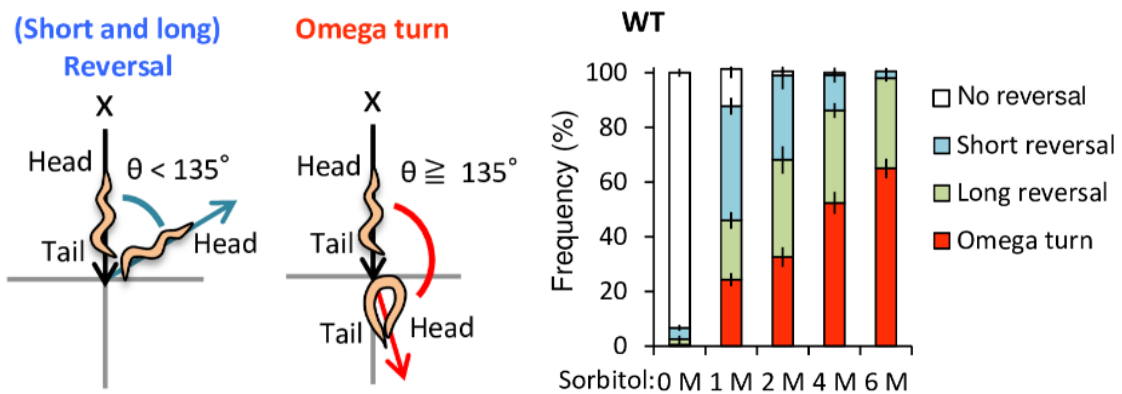


Figure 1. Differential use of escape behaviors in *C. elegans* depending on stimulus intensity. Escape behaviors are classified as reversals or turns based on the turning angle (θ). Weak stimuli predominantly evoke reversals, whereas strong stimuli more frequently induce turns (Hori S., et al., 2018).

Optimization of the types and timing of avoidance behaviors depending on the intensity of a noxious stimulus is essential for survival; however, processing in the central nervous system and its developmental bases are largely unknown. We had reported that *Caenorhabditis elegans* preferentially selects one of three different types of avoidance behaviors depending on the strength of the noxious stimulus. We screened 279 neuronal transcription factors using a combination of optogenetics and RNA interference methods and identified 19 candidates required for avoidance behaviors. Our study will provide a novel molecular basis to specify the synaptic functions for complex behavior.

1. Hori, S.*, Mitani, S. (2025) Male *Caenorhabditis elegans* optimizes avoidance behavior against acute and chronic stress for successful mating with hermaphrodites. *Zool Lett*, 11, 4. *: Corresponding author, 2. Hori, S., et al. (2018) OFF-responses of interneurons optimize avoidance behaviors depending on stimulus strength via electrical synapses. *PLoS Genet*, 14(6), e1007477.

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