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High Throughput Interrogation of Behavioral Transitions in C. elegans MOCHI LIU, JOSHUA SHAEVITZ, ANDREW LEIFER, Princeton University — We present a high-throughput method to probe transformations from neural activity to behavior in *Caenorhabditis elegans* to better understand how organisms change behavioral states. We optogenetically deliver white-noise stimuli to target sensory or inter neurons while simultaneously recording the movement of a population of worms. Using all the postural movement data collected, we computationally classify stereotyped behaviors in *C. elegans* by clustering based on the spectral properties of the instantaneous posture. (Berman et al., 2014) Transitions between these behavioral clusters indicate discrete behavioral changes. To study the neural correlates dictating these transitions, we perform model-driven experiments and employ Linear-Nonlinear-Poisson cascades that take the white-noise stimulus as the input. The parameters of these models are fitted by reverse-correlation from our measurements. The parameterized models of behavioral transitions predict the worm's response to novel stimuli and reveal the internal computations the animal makes before carrying out behavioral decisions. Preliminary results are shown that describe the neural-behavioral transformation between neural activity in mechanosensory neurons and reversal behavior.

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