Abstract

Motion detection is a universal feature of most animals' visual systems, and *Drosophila melanogaster*'s mechanism is notably well-studied. Previous reports[1] [2] highlight heterogeneity in T4 cell tuning directions, though the precise number of subtypes remains debated. Here, I investigated the directional tuning properties of the fly's T4 motion-detection neurons using a connectome-constrained model. Building on the recently published connectome dataset[3] I employed three different approaches: analyzing the raw connectivity graph, simulating an untrained connectome-constrained network, and simulating trained connectome-constrained networks. All methods indicate that T4 neurons cluster around four distinct directions—roughly, but not strictly, cardinal. Additionally, T4 cells in layers C and D of the lobula plate exhibit broader directional responsiveness compared to those in layers A and B. While these findings align more closely with earlier work[1], further investigation—such as incorporating the 3D structure of the fly's eye and examining the impact of model initialization—remains necessary.