

## **Description of Additional Supplementary Files**

File Name: Supplementary Movie 1

Description: Body and nervous system of a 3rd instar *Drosophila* larva.

File Name: Supplementary Movie 2

Description: 3D view of the body and nervous system of a 3rd instar *Drosophila* larva, with zoom on motor neuron terminals.

File Name: Supplementary Movie 3

Description: Schematic body plan (top; from Demerec and Kaufmann, 1940) and indication of orientation using a 3D print from the file in Movie 1 (bottom), followed by a series of optical sections from ventral to dorsal, and back.

File Name: Supplementary Movie 4

Description: Indication of orientation using a 3D print from the file in Movie 1, followed by a series of optical sections from anterior to posterior, and back.

File Name: Supplementary Movie 5

Description: Indication of orientation using a 3D print from the file in Movie 1, followed by a series of optical sections from left to right, and back.

File Name: Supplementary Movie 6

Description: Visualization of APL connectivity within the mushroom body (left) and of all MBINs, PNs, KCs, and MBONs (right) using a standard force-directed algorithm (Fruchterman and Reingold 1991). Based on the connectivity data available in Eichler et al. (2017).

File Name: Supplementary Movie 7

Description: Visualization of DAN-i1 connectivity within the mushroom body (left) and of all MBINs, PNs, KCs, and MBONs (right) using a standard force-directed algorithm (Fruchterman and Reingold 1991). Based on the connectivity data available in Eichler et al. (2017).

File Name: Supplementary Data 1

Description: Documents the behavioral data presented in the Figures and Supplementary Figures.