

Name	Description	Metrics Collected	Arena Geometry	Throughput	Duration	Activity Inclusion Criteria
Activity Screening	Activity measurement profiling at the start of the decathlon experiment used to narrow future testing from a cohort of 288 flies to the most active 192 flies	circlingBias, turnBias, choiceNumber, turnClumpiness, handSwitchiness, meanSpeed, boutNumber, boutLength, boutClumpiness	Y-shaped arena with arms equally spaced apart at 120 degrees (12.7mm length for each maze arm)	96 flies per behavioral box	2 hrs	highest 192 choiceNumber
Arena Circling	Open exploration of circular arena.	circlingBias, meanSpeed, boutNumber, boutLength, boutClumpiness	circular (28mm diameter)	48 flies per beahvioral box	2 hrs	meanSpeed > centroid error
Circadian	Overnight activity level monitoring on food.	circlingBias, meanSpeed, boutNumber, boutLength, boutClumpiness	96-multiwell plate (6.8mm diameter, 10.5mm depth)	96 flies per behavioral box	20-21 hrs	meanSpeed > centroid error
LED Y-maze Phototaxis	Discrete two-choice (light or no light) phototactic assay. Choices are scored as turns toward or away from a lit arm of the maze and as turns to the right or left of the choice point.	circlingBias, turnBias, photoBias, choiceNumber, turnClumpiness, handSwitchiness, photoSwitchiness, meanSpeed, boutNumber, boutLength, boutClumpiness	Y-shaped arena with LEDs at the end of each arm (12.7mm length for each maze arm)	72 flies per behavioral box	2 hrs	choiceNumber > 10
Olfactory Sensitivity	Odor vs no-odor adaptation assay measuring sensitivity to a low concentration (typically aversive) odorant	odorOccupancy, preodorOccupancy, turnBias, choiceClumpiness, handSwitchiness, choiceNumber, meanSpeed	linear tunnels with odorant ports at either end and decision boundary in center	15 flies per experiment	15 min (3 min preodor, 12 min odor)	meanSpeed > centroid error
Optomotor	Optomotor response assay where flies are repeatedly targeted with a high-contrast rotating pinwheel stimulus projected onto the arena floor	circlingBias, optoIndex, meanSpeed, trialNumber, boutNumber, boutLength, boutClumpiness	circular (28mm diameter)	48 flies per beahvioral box	2 hrs	meanSpeed > centroid error
Spatial Shade-Light	Phototaxis assay where dark and light occupancy are measured. Individual arenas are targeted with a half lit, half dark spatial pattern.	circlingBias, meanSpeed, boutNumber, boutLength, boutClumpiness, photoOccupancy	circular (28mm diameter)	48 flies per beahvioral box	2 hrs	meanSpeed > centroid error
Temporal Shade-Light	Phototaxis assay where dark and light occupancy are measured. Individual arenas are either fully dark or fully lit depending on fly position relative to an invisible virtual boundary.	circlingBias, meanSpeed, boutNumber, boutLength, boutClumpiness, photoOccupancy	circular (28mm diameter)	48 flies per beahvioral box	2 hrs	meanSpeed > centroid error
Y-maze	Discrete two-choice (right or left) locomotor handedness assay. Choices are scored as turns to the right or left of the choice point in a Y-shaped arena.	circlingBias, turnBias, choiceNumber, turnClumpiness, handSwitchiness, meanSpeed, boutNumber, boutLength, boutClumpiness	Y-shaped arena with arms equally spaced apart at 120 degrees (12.7mm length for each maze arm)	96 flies per behavioral box	2 hrs	choiceNumber > 10