Revolutionizing
Behavior Research

CLEVER Sys.

TopScan 4.00

Behavior Test/Paradigms:

- Open Field
- Light/Dark Box
- Elevated Plus Maze
- Elevated Zero Maze
- Barnes Maze
- Hole-Board
- Y-Maze/T-Maze
- Corner Test
- Rearing
- Grooming
- Circling
- Head-Twitching
- Darting(Drug Effect)
- Cross Over
- Head-Dipping (Elevated Plus Maze /Zero Maze)
- Social Interaction
- Tube-Test
- And many more!
- Active / Passive Avoidance / Shuttle Box
- Conditional Place Preference
- Morris Water Maze
- Radial-Arm Maze
- Novelty-Seeking / Object Recognition / Sniffing
- Odor Recognition / Preferences
- Spray Test
- Thermal Gradient Test
- Attentional Set Shift
- Head-Waving (Drug Effect)
- Locomotor/In-Place/Immobile
- Stretch-Attend Posture
- Operant Conditioning
- Social Preference
- Social Recognition
- Aggression

Supported Behavior Events/Measures

- Zone Visits
- Speed
- Body Elongation
- Dist To Point(s)
- Orientation To Point
- Motion
- Body Cross Area
- And many more!
- %Body In
- Moving Distance
- Turning Angle
- Dist To Area
- Orientation To Line
- Thigmotatic Behaviors
- Turning (Water Maze)

Features:

- High-Throughput capability up to 96 simultaneously
- Real-time or offline
- Detailed statistics about events that occurred during the experiment
- Automated Binned Data Output
- Automatic Graphing and Charting included!
- Result review, Visualization of Acquired Experiments
- Batch-mode allows user to run multiple videos successively without human intervention.

Powered by advanced AI-based computer-vision technology, TopScan automatically tracks and analyzes animal movement and behavior with unmatched precision — no more manual scoring or guesswork.
Whether you're running Novel Object Recognition (NOR), Open Field, or Social Interaction tests, TopScan precisely identifies body parts (nose, forebody, tail base, and center of mass) in real time, quantifying true sniffing, exploration, head-twitching and head-dipping events with >90% accuracy compared to human scoring.

TopScan provides a flexible and extendable framework that allow user to customize based on their needs. Generally, there are FOUR Sub-Modules -- LocoScan, ObjectScan, MazeScan and WaterMazeScan in the TopScan Suite. Any or all of those 4 product combinations may be purchased. Additional functionalities for integration into TopScan include Circling, Rearing, Grooming, and Thigmotactic behaviors etc.

LocoScan allows automated analysis of locomotor activity. The system offers the flexibility for the animal to be placed in an arena with or without bedding. LocoScan outputs detailed statistics about locomotor behavior such as total distance traveled, average speed, average turning angle, etc. It also allows the user to divide the cage or arena into zones of any shape and LocoScan will output zone - specific statistics including zone entry and exit statistics, average speed and turning angle within each zone, length of stay in each zone, etc.

ObjectScan automatically detects and records sniffing behavior information including object sniffed, duration of sniff, numbers of sniffs at each object, etc. The system uses video taken from the top with objects placed in a pre-defined region. ObjectScan ensures that sniffing is counted only when the animal's nose is in contact (or in a specified distance) with an object, without coloring animal's head, as it can automatically identify important body parts of the animal such as nose, tail, forelimbs and hind limbs all the time.

MazeScan automates the analysis of experiments conducted on all types of mazes including Elevated Plus Maze, Zero Maze, Radial Arm Maze, Y- or T-Maze, etc. In addition to detecting traditional parameters like entries into each arm/area and time spent in each arm/area as events, we provide the capability to detect novel parameters such as Stretch - Attend behavior (SAP), Protected SAP (p-SAP) and Unprotected SAP (u- SAP), Head-Dipping behavior, Body-across-two-zones (partial incursions into a zone).

WaterMazeScan automates the analysis of the popular Morris Water Maze experiment. The video is taken from the top, and WaterMazeScan will analyze this video to provide a variety of significant results. In addition to traditional parameters such as latency to platform and distance traveled, we provide advanced measures such as Heading Error (orientation difference from platform direction), Turning Ratio (number of turns per body length traveled), etc. The Turn behavior is special to the WaterMazeScan product and can count the number of turns the animal performs in the water.

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(Continued from front)

Key Features:

- Flexible Architecture allow user define own event and measures
- Clive-n-Play Event Review and Validation
- Easy Integration and Sync with 3rd party (e.g. physiology) systems
- Powerful Result Post-Processing and Export Mechanism

Results:

- Objective Behavior analyzing Results
- Automatic Export to Excel or general CSV with support of 3rd party Spreadsheet Software (e.g., LibreOffice, WPS)
- Complete Experiment Database Management
- Summary of All Occurred Events, Times of occurrence, Duration, Latency, occurrence, various measures during occurrence
- Binned data at user-defined bin intervals

Product Options:

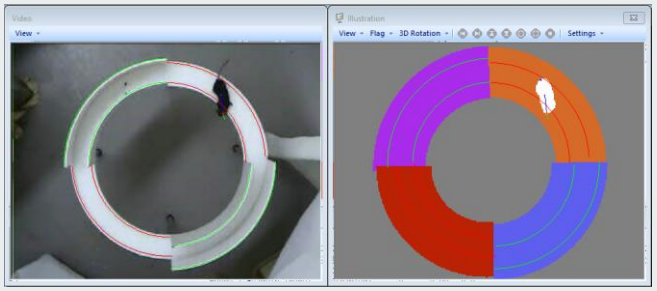
- Basic Option (BSC Option)
- High-Throughput Option (HPT Option)
- Basic Real-time Option (BRT Option)
- High-Throughput Real-time Option (HRT Option)

Requirements:

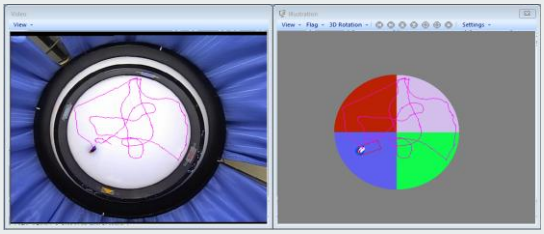
- High-Performance Windows -based PC Work Station
- High-speed Processor
- Large HDD space

System Analyzing Interfaces of *TopScan 4.00* on Open Field, Zero Maze, Water Maze, Head-Twitch (HTR), Social Fear Conditioning, Tube Test are shown below:

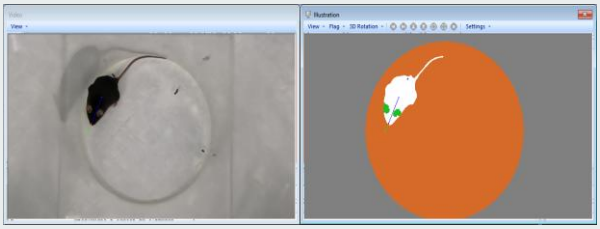
Open Field



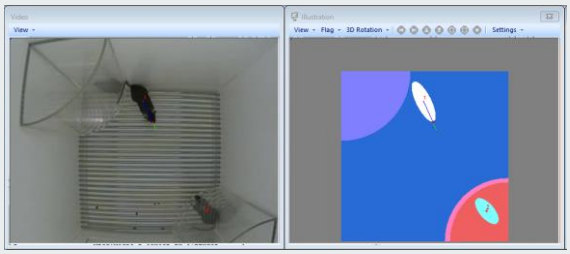
Zero Maze



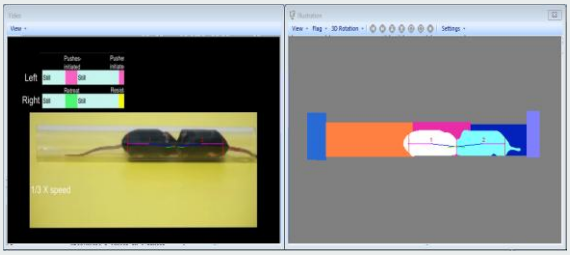
Water Maze



Head-Twitch

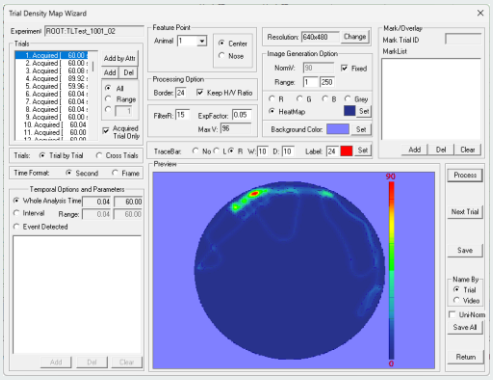


Social Fear Conditioning



Tube Test

Each detected event record can be reviewed/validated through the Click-n-Play review mechanism. Statistics results (bouts/times, total duration, moving distance, velocity. Etc) are calculated for each defined event. Further analysis can be achieved through post-processing, e.g., Bin, Value, Hist and Filtering operation. Result can be exported into Excel, or standard CSV format which can be opened by 3rd party free/open source Spreadsheet Software (e.g., LibreOffice, WPS. etc). User can also exploit the Trace Image and Density Map/Heat-Map to prepare data for manuscript publication.



Keyword/Tags: Video Tracking, Animal Behavior Analysis, Comprehensive Behavioral Research

URL: https://cleversysinc.com/CleverSysInc/csi_products/topscan-suite/

Publications:

- Aron, L., Ngian, Z.K., Qiu, C. et al. Lithium deficiency and the onset of Alzheimer's disease. Nature 645, 712 – 721 (2025). https://doi.org/10.1038/s41586-025-09335-x
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