



Revolutionizing
Behavior Research



ForcedSwimScan

Features:

- Fully automated complete Forced Swim Analysis
- Side-view based analysis for accurate analysis
- Extended Forced Swim Test Protocol
- Real-time or offline
- Easy setup with design tools
- No user intervention required during experiment
- Detailed statistics about the activity that occurred during the experiment
- Automated Binned Data analysis
- Validated with respect to human observation, as well as, pharmacologically
- High-Throughput capable with 4 tanks simultaneously
- Full color-analysis
- Detection and analysis of body parts to allow more flexibility for the user to define which activity is which
- Automatic adaptation to the dynamic water surface typical of such experiments
- Result review, Visualization of Acquired Experiments
- Batch-mode allows user to run multiple videos successively without human intervention

Behaviors ForcedSwimScan can detect:

- Escape/Struggle
- Climb
- Full Dive
- Immobile/Float
- Passive Dive
- Swim

ForcedSwimScan is a component of our **DepressionScan Suite**. The forced swim test, as originally described by Porsolt et al., is the most widely used pharmacological method assessing antidepressant activity. This is largely due to its ease to use, reliability across laboratories, and ability to detect a broad spectrum of antidepressants. ForcedSwimScan, not only provides more accurate results, but is also able to support the “Extended Forced Swim Test”, measuring the time spent struggling/escaping/climbing/diving versus time spent floating/immobile/passive swimming in a tall cylinder filled with water.



Though easy to use, the observation by humans has been a burden for research scientists. Human observers, relying on a stopwatch, are heavily burdened if they are taking notes while watching out for behaviors. Corroboration among multiple observers is needed to ensure reliable results, thus it becomes an expensive process. The process is time consuming, prohibiting high throughput screening.

ForcedSwimScan is designed to relieve all those problems and automate the entire observation process of the forced swim test. It takes video of the experiment, analyzes the video, and automatically calculates the time spent struggling/escaping/climbing and time spent floating/immobile/passively swimming. All these individual behavior sub-categories can be measured and output separately. Hence, the user has the flexibility to either analyze these sub-category data or analyze combined entire category data.



ForcedSwimScan

(Continued from front)

Applications:

- Depression Analysis

Results:

- Objective Results
- Up to 6 classes of categorization
- Automatic Export to Excel
- Complete Experiment Database Management
- Summary of All Occurred Activity and their Durations
- Binned data at user-defined bin intervals
- Preset Start and Stop conditions for accurate interval data collection

Product Options:

- High-Throughput Option (H Option)
- Realtime Option (R Option)
- High-Throughput Realtime Option (HR Option)

Requirements:

- Windows-based PC
- Intel High-speed Processor
- Special Videocard for realtime analysis
- Large HDD space for storage
- Good lighting conditions and contrast with background
- IR-switchable camera or red-light for dark conditions

The forced swim test is a highly variable test from lab to lab and accordingly, ForcedSwimScan has been designed to be very flexible. The software detects the body parts of the animal and allows the user to set whether to use body part motion or full body motion for analysis. ForcedSwimScan allows the user to precisely set his/her definition of struggle/escape/climb/dive and float/immobility/swim behaviors. The cornerstone of ForcedSwimScan is its unique ability to identify animal body parts and their motion to achieve precise analysis, not just relying on simple overall motion detection.

ForcedSwimScan software detects 6 separate classes of activity for this test. Our six classes of activity include Escape (or Struggle), Climb, Immobility (or Float) Full Dive, Passive Dive, and Swim. The Swim class is essentially comprised of the gentle swim periods in the experiment. Escape class is the highly active class where the animal is swimming fast with limbs thrashing the water. Climb is the vertical activity of the animal. Full Dive and Passive Dive are the two classes of dive behavior with the former being the full dive where the animal trying to escape by diving under and the latter is the type of dive where the animal simply becomes submerged briefly while being immobile. Immobility is the class where the animal or certain body parts show little or no movement. Finally, Swim class is the “in-between” class where the animal is neither escaping nor immobile.

The following results section shows the durations in each of those 6 categories for 4 animals analyzed simultaneously. Up to 4 animals can be analyzed simultaneously with the High-Throughput Option. Realtime Option provides the ability to perform analysis in realtime while the video is compressed and saved to the hard-drive of the computer.

Result Type	Escape	Immobile	Climb	Dive	PassDive	Swim
Tank#1 Ranges:	30.60	173.08	30.20	0.00	0.00	6.08
Tank#2 Ranges:	110.72	93.00	13.76	0.00	0.00	22.48
Tank#3 Ranges:	21.96	174.04	8.16	0.00	0.00	35.80
Tank#4 Ranges:	45.52	85.84	57.28	0.00	0.00	51.32

ForcedSwimScan comes with a complete Experiment Data Management framework that allows users to maintain and group export results from multiple trials in an experiment. Group Export can summarize result data from all animals into a single Excel sheet for convenience. No more cutting and pasting! Other salient features include the ability to start and stop analysis at preset time/duration as well the ability to perform offline batch analysis where multiple videos can be successively analyzed by ForcedSwimScan without user intervention.

Unique Capabilities:

- Complete Hardware and Software Solution
- Analyzes 640x480 at 30 frames per sec
- Detects animals in low contrast also!
- Works with rodents of all colors/sizes
- Records video into storage during analysis
- Advanced flexibility to obtain the exact replication of human scoring methodology

