



## Revolutionizing Behavior Research



# DSRScan

DSRScan is a part of our SocialScan Suite, and is also a part of our DepressionScan Suite. DSRScan quantitatively and qualitatively measures one type of social behavior of two (2) animals that are competing for a reward (food) in a specially designed device. This product captures and tracks two (2) animals (mice or rats) in the device, and automatically determines which animal exhibits dominance behavior and which animal exhibits submissive behaviors. Dominant-subordinate behavior in animals, as determined in laboratory studies, can be used to model depression and mania in humans.

### Features:

- Complete Top-View based Dominance Submissive Social Behavior Analysis software
- Includes ability to do Social Contact as well as some MazeScan related behaviors
- High-Throughput capability up to 16 arenas simultaneously
- Ability to analyze Dominance Submissive behavior of up to 2 animals in the same arena
- Real-time or offline
- Continuous lengthy recordings and analysis possible
- Easy plug-n-play functionality
- No user intervention required during experiment
- Detailed statistics about events that occurred during the experiment
- Automated Binned Data Output
- Automatic Graphing and Charting included!
- Validated to be more than 90% accurate with respect to human scoring
- Full color-analysis
- Automatic adaptation to changing environment, non-uniform lighting, etc.
- Result review, Visualization of Acquired Experiments
- Extensive Experiment Database Management included!
- Batch-mode allows user to run multiple videos successively without human intervention

### Events DSRScan can detect:

- Social Contact
- Area/Body part in Area
- Time Nose in Food Zone
- Time Animal & Body Parts in Tunnel, Home arena



This tool supports automated analysis of dominance and submissiveness, which are defined in a competition test and measured as the relative success of two food-restricted animals (rats or mice) to gain access to a feeder (e.g., milk pool). Submissive behavior for one subject can be objectively measured as the amount of time spent at the feeder relative to that by the paired dominant animal. During the testing period, each feeding event by a specific subject is automatically detected and calculated with regard to its length of time. Test results are output to Excel files and statistics are calculated.

Our DSRScan has several unique and important features in analyzing dominance/submissive behaviors among animals. First, the system recognizes each animal reliably, identifies its entire body and important body parts such as head, tail, positions of forelimbs and hind limbs, and genital part, rather than tracking the colors marked on animal's body.

Second, the system, as a result of identifying animal's body parts, makes sure that only when animal's mouth is in contact with the food feeder is counted as a feeding event. When the animal's body is close to the feeder, but the mouth is not in contact with the feeder is not counted, which often happens when a system that tracks the colors marked on the animals' bodies.



## DSRScan

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### Applications:

- Dominance Submissive Test
- Depression
- And many more!

### Results:

- Objective DSR Behavior Analysis Results
- Automatic Export to Excel
- Complete Experiment Database Management
- Summary of All Occurred Events, Times of occurrence, Durations, Latency to occurrence, various measures during occurrence
- Binned data at user-defined bin intervals

### 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
- IR-switchable camera or red-light for night
- Video-multiplexer for multi-camera feed

Third, the system can differentiate two (2) mice without artificially coloring (marking) them, as long as they have some slight difference in terms of color or contrast or sizes. The system will automatically determine who is who, even after two (2) animals get together and then depart from each other.

DSRScan is essentially a partial combination of the SocialScanTop and MazeScan products. It incorporates some events from each of those two products. DSRScan detects Social Contact as well as the Area event where, the user can detect an event based on a body part of an animal being in a special area, such as the nose being in the milk receptacle.

Combined with our other products such as SocialScanTop, the system can even further automatically identify courtship of these two animals, and will determine the social interactions of approach, avoidance, sniffing, and contact based on the automatically detected heads and tails of animals, and their relative spatial positions and movements.

The techniques for automation of the quantification of Dominance-Submissiveness relationship between animals have been applied to achieve high throughput screening. System architecture for high throughput screening has been designed that involves analysis up to 16 pairs of animals and 16 devices per computer.

The High-Throughput product option is necessary to analyze more than a single arena simultaneously. The Realtime Option is necessary to perform realtime analysis where the live video feed into the computer is compressed, encoded, saved to the hard drive while simultaneously full analysis of the video is performed.

Many advanced features are incorporated, including supporting full color analysis, automatic adaptation to non-uniform or changing environment, automated handling of light/dark areas, variable speed playback of specific video segment for specific detected behavior, etc.

Complete Turn-key systems including all necessary Hardware and Software are available. Custom design of your environment to facilitate analysis, including lighting condition setup, IR/red light setup, cage enclosures, video integration, and video-feed to computer is also available.

### Unique Capabilities:

- Complete Hardware and Software Solution
- Analyzes 640x480 at 30 frames per sec
- Dominance Submissive Behavior Analysis without need to color animals unless absolutely necessary!
- Controls other hardware devices via I/O ports
- Detects animals in low contrast also!
- Works with rodents of all colors/sizes
- Records video into storage during analysis