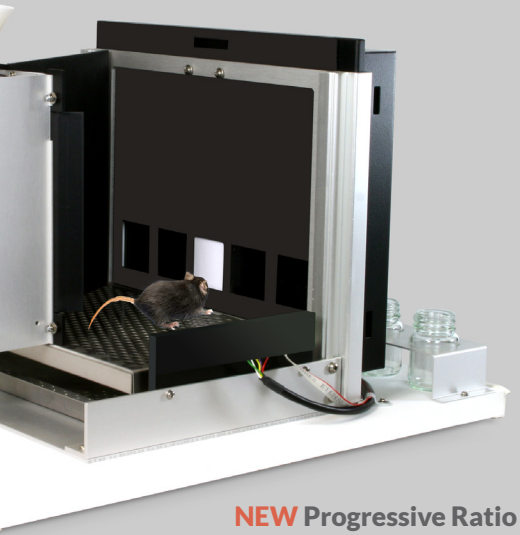
Bussey-Saksida Touch Screen

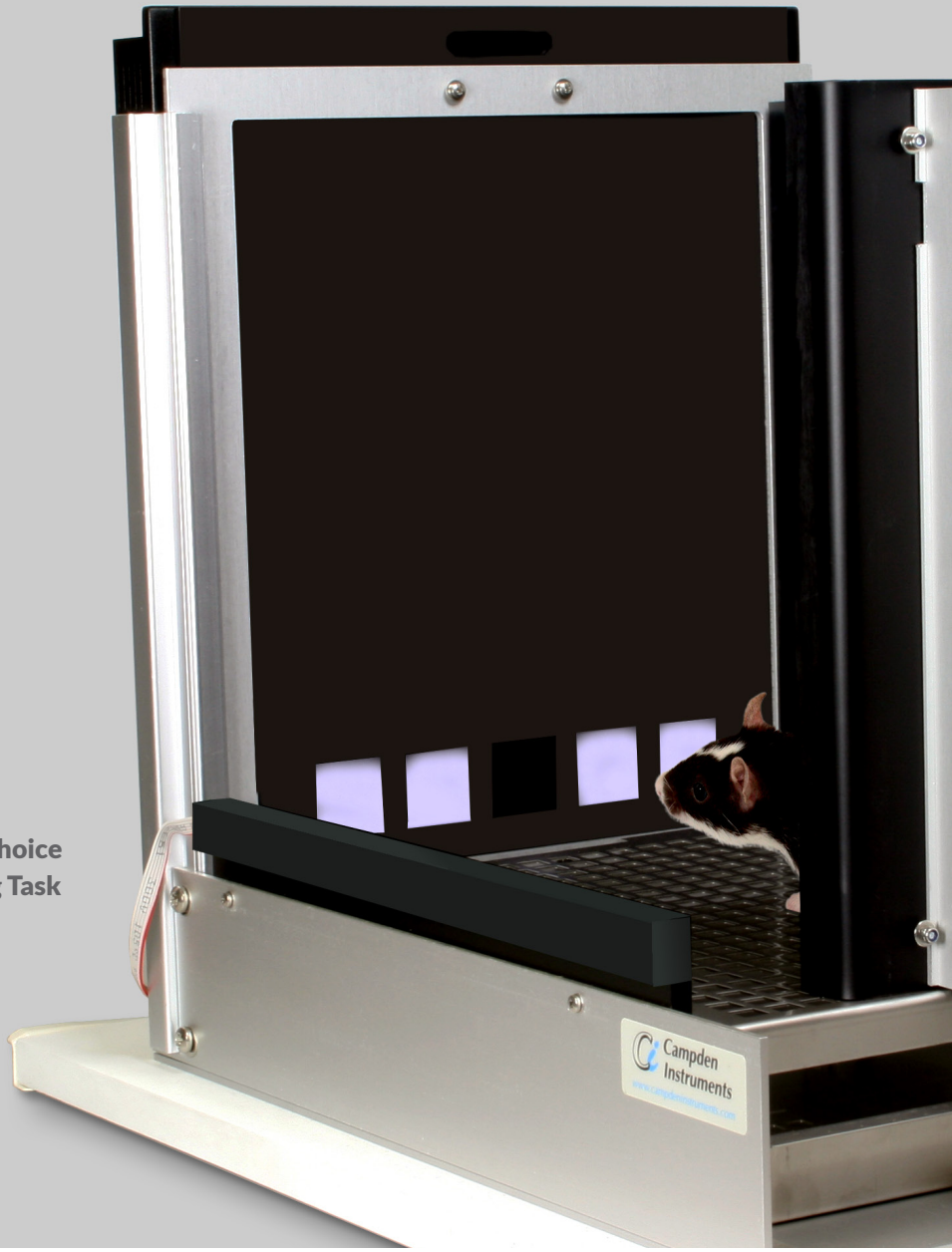
Standard Tasks and Bibliography

NEW Continuous Performance Task



NEW Progressive Ratio and Effort-Related Choice Tasks

NEW 4-Choice Gambling Task

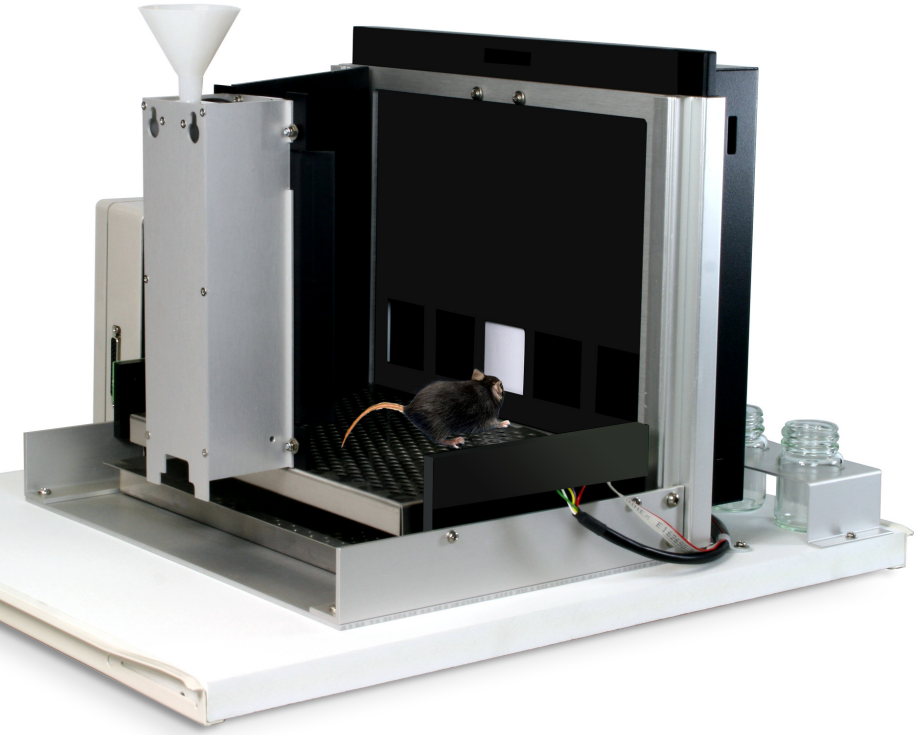


Lafayette Instrument®

STANDARD PARADIGMS

Prewritten Standard Paradigms with established neuro-pathological relevance.

Our Bussey-Saksida Touch Screen Chambers for Rats and Mice are designed for the **efficient and high-throughput cognitive evaluation** of rodents. For these systems we offer many standard paradigms, prewritten to include the entire battery of tasks necessary to **habituate, shape, and bring the animal to criteria** on that particular application, as well as collect and analyze data. These standard tasks, described here, **translate directly to well established monkey and human touch models.** The pre-written task schedules and analysis files are customizable to your research requirements.

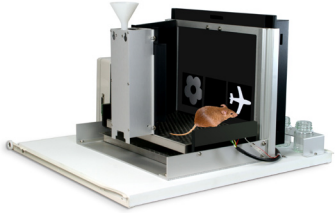


About the Task Paradigms

Rat and Mouse Paradigms for the Bussey-Saksida Touch Screen Chambers, by arrangement with the University of Cambridge
All paradigms include the training routines as well as the main experimental paradigm and the data analysis sets.

Two-Choice Pairwise/Visual Discrimination Reversal (PD)

The task involves learning that one of two shapes displayed simultaneously on the screen is correct. Touching the correct stimuli (S+) will be rewarded with food. Touching the incorrect stimuli (S-) will be punished with a timeout. Once the task has been learned, the stimuli are reversed so that the S+ stimuli now becomes the S- stimuli and vice versa. This reversal learning requires inhibition of prepotent responses and is known to be dependant on the prefrontal cortex.

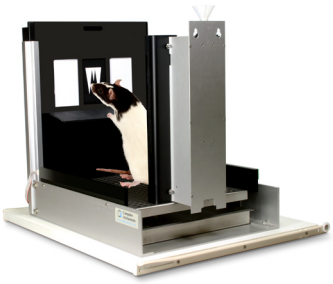


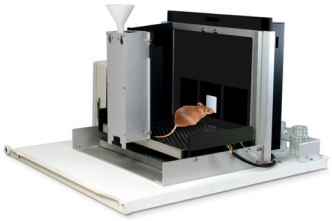
Paired Associate Learning (PAL)

In humans, a similar task has proved to be highly effective for the early detection of Alzheimer's disease. In the PAL task for rodents, subjects learn and remember which of three objects goes in which of three spatial locations. On a given trial, two different objects are presented; one in its correct location; the other in an incorrect location. The subject must choose which stimulus is in the correct location. The task has been shown to be sensitive to cholinergic transmission and to hippocampal dysfunction and can dissociate glutamate from acetylcholine receptor function in the hippocampus.

Visuomotor Conditional Learning (VMCL)

This is a habit or stimulus-response task in which the rodent learns a rule of the type "If shape A is presented, respond to the left location; if shape B is presented, respond to the right location". This type of test is sensitive to damage in the dorsal striatum and is therefore relevant to Huntington's and Parkinson's disease.



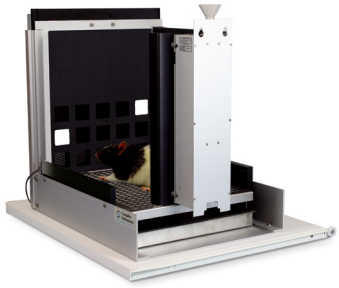


Extinction (EXT)

The task is very simple, but powerful. Like reversal, it is a test of behavioral inhibition, but with different requirements. In fact, some animals are impaired on reversal, but not extinction, and vice versa. Subjects are first required to respond to a white square presented in the center window to obtain reward. Once criterion is reached, extinction of the response is tested in sessions where responses to the stimulus are no longer rewarded.

Trial-Unique Nonmatching-to-Location (TUNL)

TUNL can be thought of as a version of delayed nonmatching-to-place (DNMTP), in which the subjects are presented with a sample location, and following a delay, with the (incorrect, S-) sample location and a (correct, S+) nonmatching location. DNMTP has been shown to be vulnerable to non-spatial mediating strategies. TUNL eliminates these problems by using multiple, trial-unique locations, preventing the use of mediating strategies. Animals with lesions in the dorsal hippocampus or decreased hippocampal neurogenesis were impaired when the locations were close together, but not when they were far apart. This feature also renders the task exquisitely sensitive to hippocampal dysfunction, tapping both the role of the hippocampus in memory and in pattern separation. A simpler version using 5 positions is available for mice.



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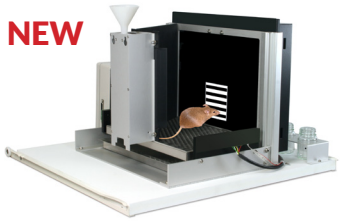
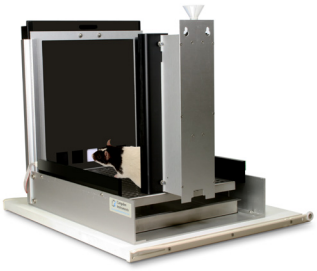


Rodent Continuous Performance Test (rCPT)

In the rodent Image CPT task, 5 different black and white images are used. They are shown briefly, one at a time and in a random order, on the touch screen. One of the images is designated the target stimulus. In order to obtain reward, the subject must touch the target stimulus and withhold from touching the non-target stimuli. This task keeps the differences between pre-clinical and clinical attention tasks to a minimum.

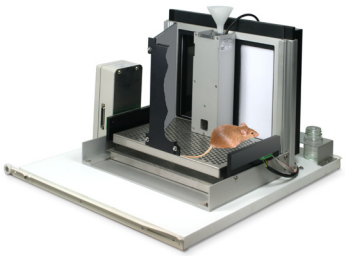
5-Choice Serial Reaction Time (5CSRT)

This task requires the rodent to respond to a brief visual stimuli presented randomly in one of 5 locations. This task in rodents is sensitive to cortical manipulations, especially those involving prefrontal cortex, and is highly dependent on cholinergic transmission.



Easy to Write Customized and Original Schedules

In addition to supporting these standard tasks, the hardware and software that make up the Bussey-Saksida System are designed to provide the tools to build unique schedules to meet exact research needs. Add images or special criterion to an existing task or start from scratch using the Schedule Builder tab of ABET II Touch.

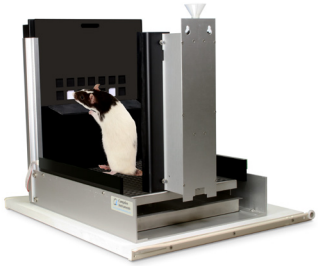


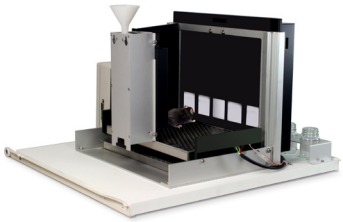
Autoshaping (AUTO)

The task measures a Pavlovian response to the screen. This is a rapidly administered test of simple classical conditioning that is dependent on a reward system centered on the ventral striatum. White vertical rectangles are presented on either side of the reward tray. One side is always followed by delivery of food reward, the other never. Reward is independent of screen approach. Approaches to the screen are measured via an IR beam detector either side of the food tray.

Location Discrimination (LD)

The subject is required to discriminate between two white squares on the screen. Responses to squares on one side of the screen will be rewarded, while responses on the other side of the screen will be punished with a timeout period. The distance between the two squares is varied from trial to trial. Animals with lesions in the dorsal hippocampus are impaired when the locations are close together, but not when they were far apart.



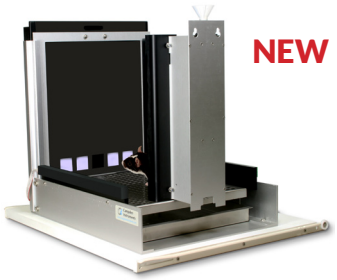


5-Choice Continuous Performance Test (5C-CPT)

Like the 5-choice serial reaction task, this task requires the rodent to respond to a brief visual stimulus presented randomly in one of 5 locations. In addition some trials present visual stimuli in all five locations together and for these trials the subject must learn to withhold a response. This go/no-go task measures both attentional and inhibitory systems within a single task paradigm, enabling the assessment of vigilance.

4-Choice Gambling Task (4C-GT)

Based on the Iowa Gambling Task, the rodent chooses from four illuminated windows. A touch in any of the windows will result in either a Win (food reward is delivered) or a Loss (timeout period with no reward). Each window is associated with a different amount of reward. The larger the associated reward, the lower the probability of receiving a Win and the longer the timeout if the trial results in a Loss. The subject must learn to avoid the high-risk, high-reward options in order to maximize earnings. The test is sensitive to serotonergic and dopaminergic agents.



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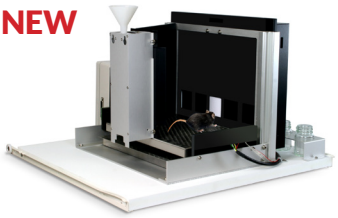

Progressive Ratio (PR) and Effort-Related Choice (ERC) Tasks

The touch screen version of the ERC and PR tasks are designed to be equivalent to tasks commonly done with levers and nose pokes. Subjects must touch the screen progressively more times to receive reward. Comparing the touch screen results with the non-touch screen literature it is evident that the touch screen paradigm produces less variable data (consequently, easier to detect significant effects) and is more sensitive to manipulations which promote PR performance (useful when screening for drugs to alleviate low motivation).

Need Assistance?

Pre-written training presentations, web-based training seminars, and task generation consultations are is available by request.

RODENT TOUCH SCREEN BIBLIOGRAPHY

Collection of Relevant Research.

Task Overview and Optimization and Species Translation

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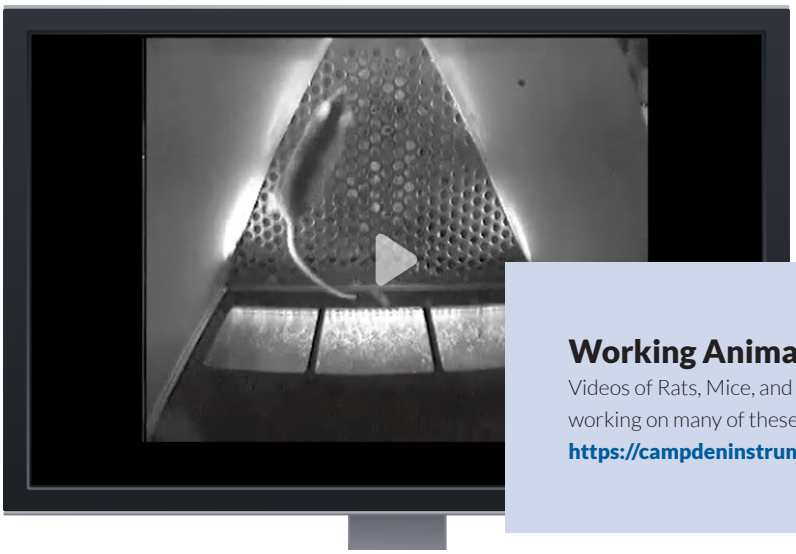

Working Animal Videos

Videos of Rats, Mice, and even Grey Mouse Lemurs and Tree Shrews working on many of these Tasks can be found on our website:
https://campdeninstruments.com/downloads/videos

Test Batteries

Benevento M, Oomen CA, Horner AE, Amiri H, Jacobs T1, Pauwels C, Frega M, Kleefstra T, Kopanitsa MV, Grant SG, Bussey TJ, Saksida LM, Van der Zee CE, van Bokhoven H, Glennon JC, Kasri NN. Haploinsufficiency of EHMT1 improves pattern separation and increases hippocampal cell proliferation. *Sci Rep*. ***2017*** Jan 10;7 ***[PD, PAL, LD, Ext]***

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Pairwise/Visual Discrimination and Reversal (PD) – over 30 papers including

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Want to Know More?

Full Reference and Bibliography documentation is available upon request or by visiting our website.

Contact Us for a Quotation or More Information

Worldwide Office

3700 Sagamore Pkwy N
Lafayette, IN 47904
USA

Phone: (765) 423-1505
Fax: (765) 423-4111

sales@lafayetteinstrument.com
www.lafayetteneuroscience.com

European Office

P.O. Box 8148
Loughborough,
Leics. LE12 7XT
England

Tel: +44 1509 814790
Fax: +44 1509 817701

eusales@lafayetteinstrument.com
www.campdeninstruments.com

The Bussey-Saksida Chambers and WhiskerServer® originate from the department of Prof. Trevor Robbins, Experimental Psychology, University of Cambridge, England.

 5.14.18

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