

# 'Continual Trials'

## NOR-OL-OPC for Rat and Mouse

Spontaneous Recognition and Episodic Memory Tasks

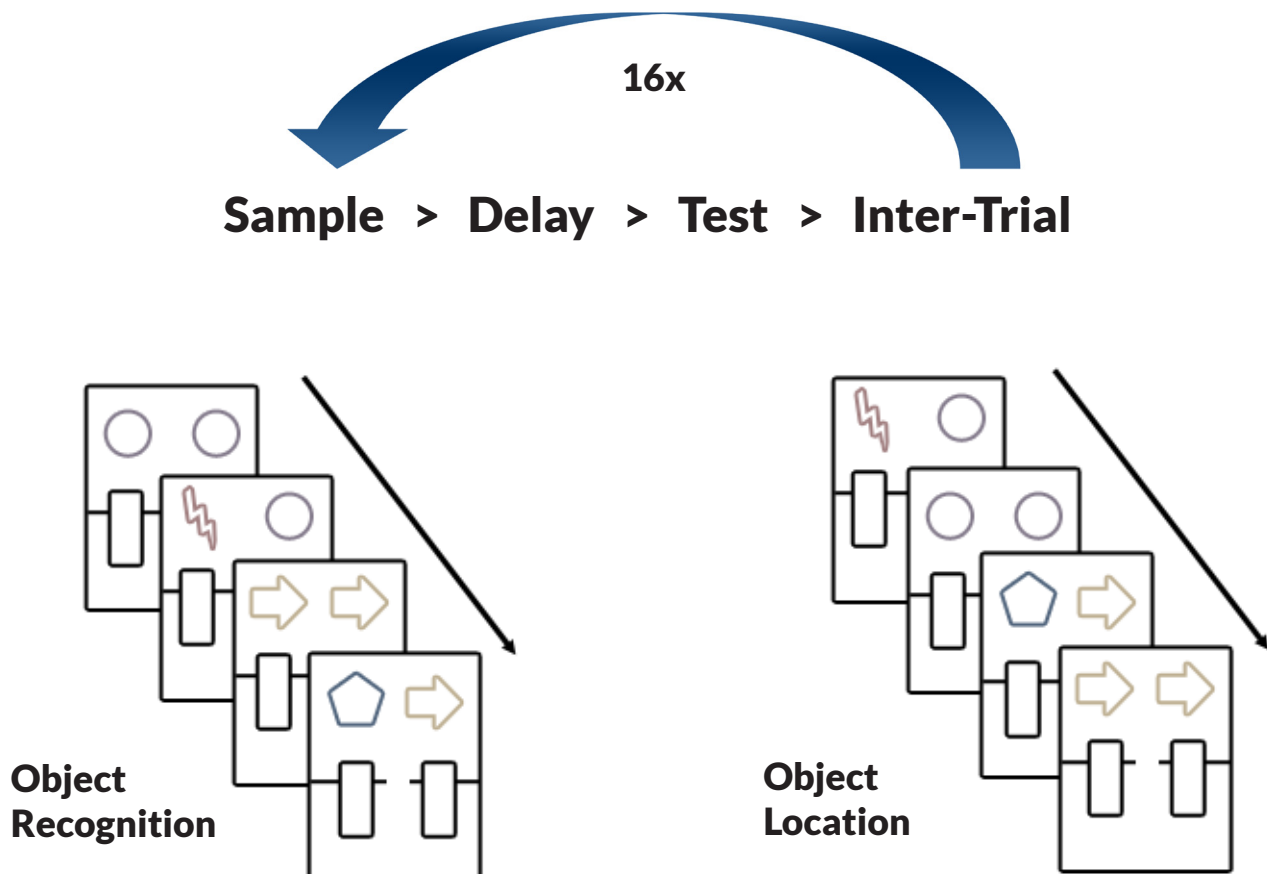
80514M  
Chamber for Mice



- High statistical power
- Reduced animal usage
- Manual Chamber and Gate
- Multiple chambers with auto-gate
- Auto-habituation
- Multiple trials per session
- Change testing context using optional tactile floors
- Video scoring app
- Exploration latency
- New windows into neural mechanisms

# EASTON 'CONTINUAL TRIALS' METHOD OF NOR & OL

It is as simple as...



*"Episodic memory is the clinically relevant form of memory impaired in older age and in conditions such as Alzheimer's disease. In recent years we have made significant progress in being able to test episodic memory in rodents through the what-where-which task. The evidence suggests not only that this task is sensitive to lesions and pathology we would expect to impair episodic memory in humans, but also that when used in humans this task produces the same experience as episodic memories. Being able to test the same clinically relevant memory process across rats and humans makes the what-where-which task a really important step in improving clinical translation of rodent behavioural neuroscience."*

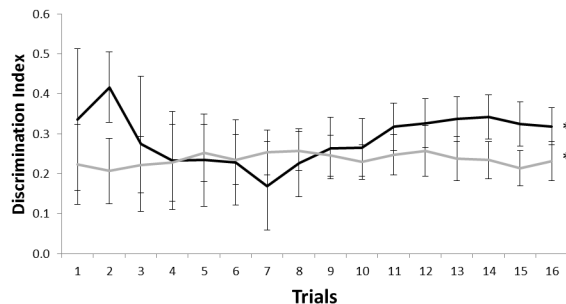
- Prof. Alexander Easton

# NEW POSSIBILITIES

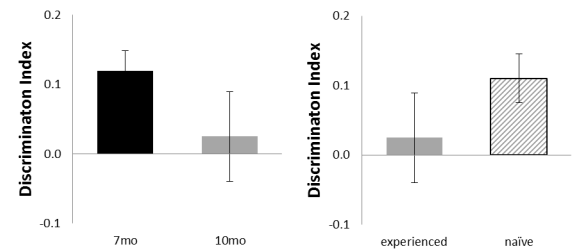
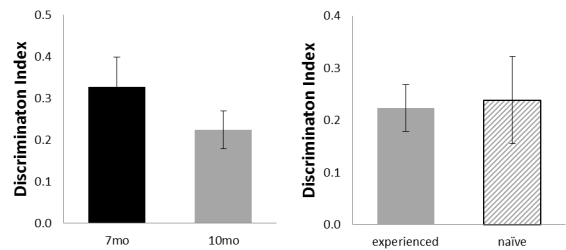
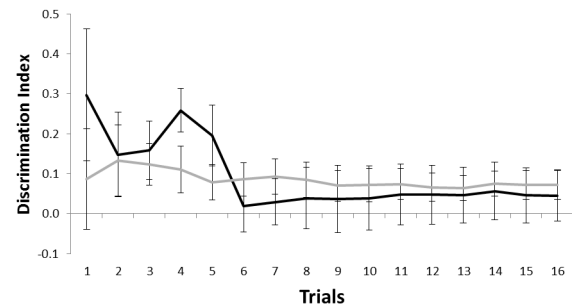
## New windows in neural mechanisms and other new NOR-OL possibilities

- Determine effects of anxiety
- Testing of compounds with short-life stability
- Developmental work with rodent pups
- Provides reliability and reproducibility and the measurement of consistent memory performance,
- Provides new windows into mechanisms, such as pro-active interference

TASTPM OR results at 7&10 months



TASTPM OL results at 7&10 months

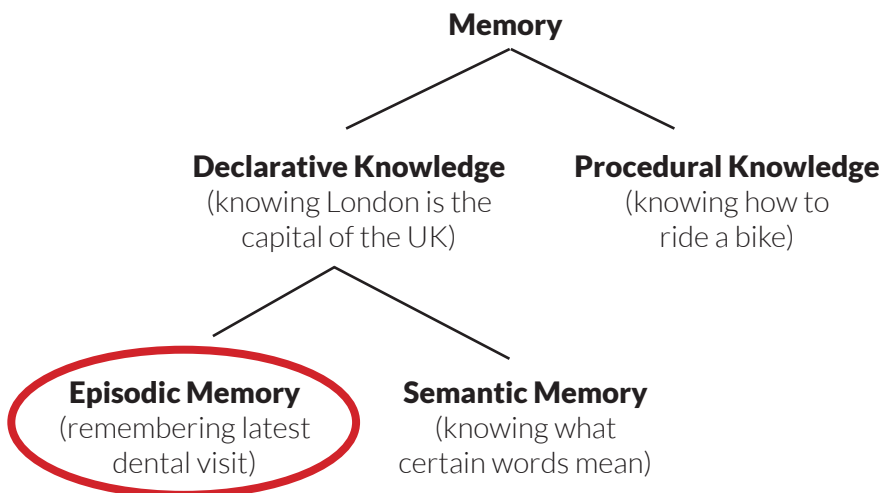


Memory load can impact performance as a result of increased interference after Chan *et al.* 2018 Frontiers in Neuroscience

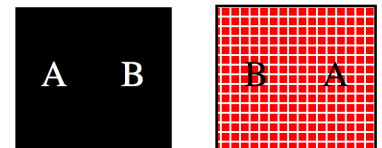
# WHY EPISODIC MEMORY?

## The Clinical Relevance and Special Nature of Episodic Memory

- Beyond simple object recognition, spontaneous recognition tasks can provide measures of clinically relevant episodic memory
- What-Where-Which (WWW) memory has been shown to be sensitive to AD pathology in mice
- What-Where-Which (WWW) task has been shown to be experienced in rodents similar to episodic memory in humans

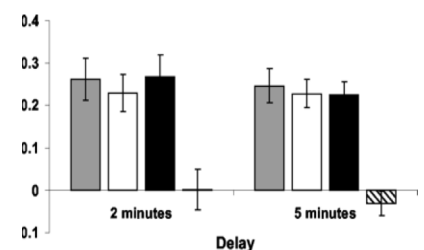


‘What-where-which’



## Episodic Memory in Rodents – The OPC / WWW Task

A Task with the associative recognition of Object and Location and with the addition of the ability to change the Context can be referred to as an ‘Object, Place, Context’ (OPC) or ‘What, Where, Which’ (WWW) Task. WWW can also refer to this Task with a temporal element the WWWWhen Task.



Eacott and Norman  
(2004) J.Neurosci

# RESEARCH AND PUBLICATIONS

## Key Publications

Ennaceur & Delacour 1988 (Object preference)

Ennaceur & Meliani 1992 (Memory for location)

Ennaceur & Aggleton 1997 (Prh lesions in spatial and NOR)

Dix & Aggleton 1999 (Object-location)

Dix & Aggleton 1999 (Object-context)

Easton, Eacott, Zinkivskay 2005; Eacott & Norman 2004 (Combinations, Episodic memory)

Eacott & Gaffan 2005; Easton & Eacott 2010 (Variety of different memories, dissociation of underlying mechanisms)

Varghese, Brett, Harland, Van-Nobelen & John Dalrymple-Alford, 2009 Episodic memory, odour context

Davies, Easton, Eacott, Gigg 2013 Episodic memory for WWW & Episodic memory – Alzheimer's-like pathology

## Continual Trials NOR & OL

Ameen-Ali, Easton & Eacott 2012 (rats)

Ameen-Ali et al 2015 (improved reliability & interpretation)

Seel, Eacott, Langston & Easton 2017 (rats)

## Continual Trials 2018 Papers

Cholinergic input to the hippocampus is not required for a model of episodic memory in the rat, even with multiple consecutive events

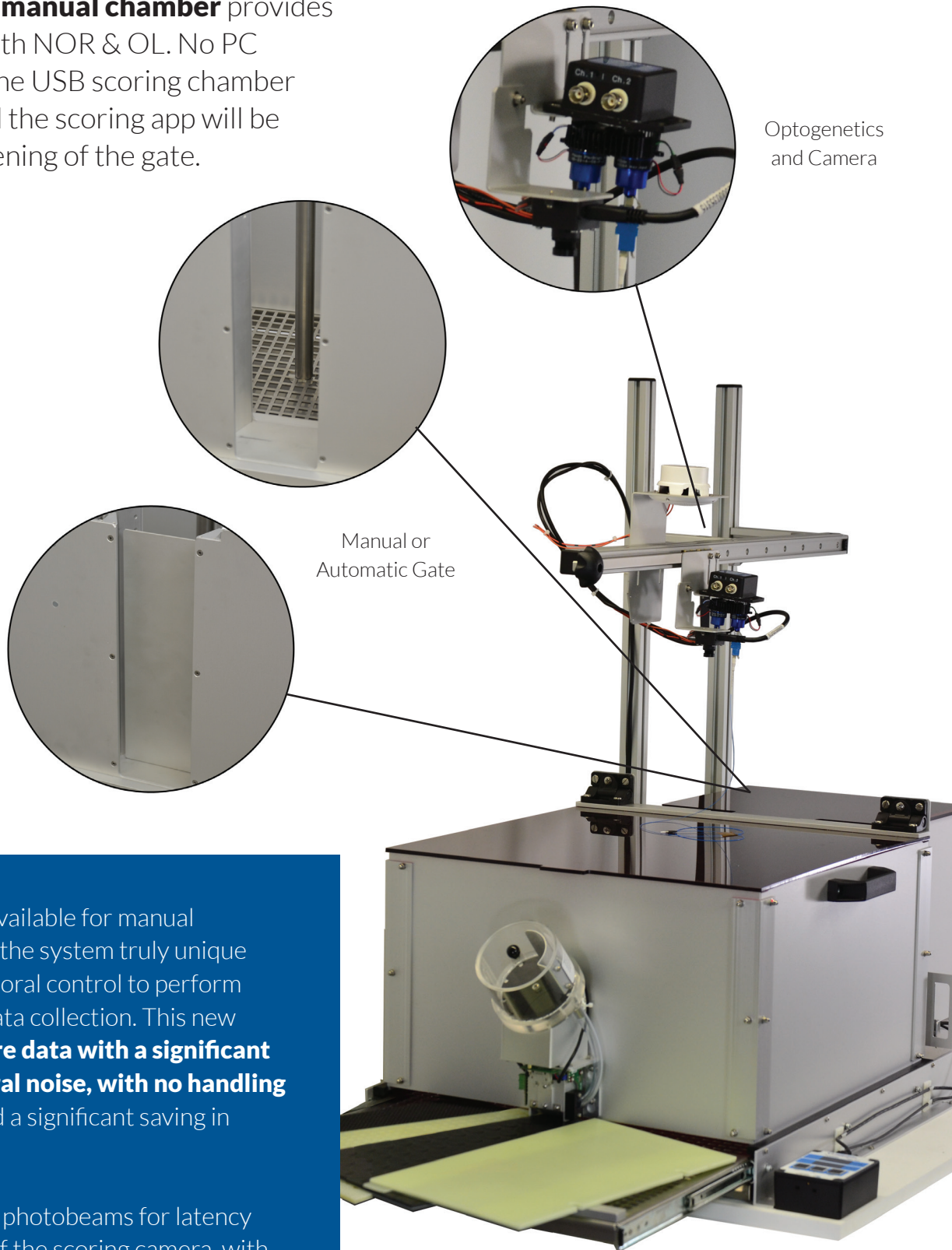
Behavioural Brain Research, Volume 354, Pages 48-54 15 November 2018, S. V. Seel, M. J. Eacott, R. F. Langston, A. Easton

Continual Trials Spontaneous Recognition Tasks in Mice: Reducing Animal Numbers and Improving Our Understanding of the Mechanisms Underlying Memory

Frontiers In Behavioural Neuroscience 13 September 2018, Chan, Eacott, Sanderson, Wang, Sun & Easton

# MODULAR SYSTEM OPTIONS

A **budget-friendly manual chamber** provides an entry level for both NOR & OL. No PC required, just plug the USB scoring chamber into your laptop and the scoring app will be triggered by the opening of the gate.



Optogenetics  
and Camera

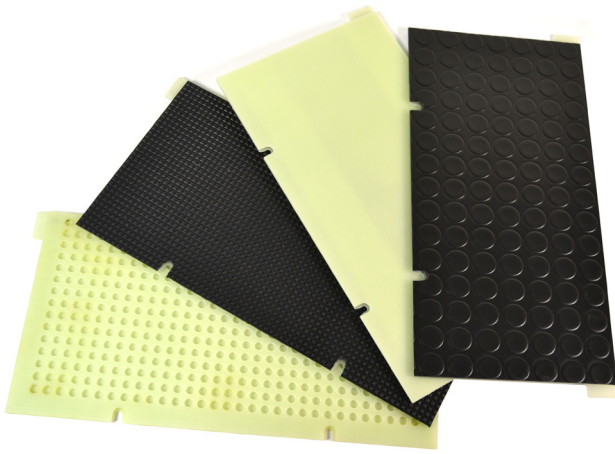
Manual or  
Automatic Gate

While the chamber is available for manual operation, what makes the system truly unique is using gates and temporal control to perform automated tests and data collection. This new approach **delivers more data with a significant reduction in behavioral noise, with no handling within the session** and a significant saving in animals.

The auto-gate includes photobeams for latency timing plus triggering of the scoring camera, with data output to the controlling PC.

80514R  
Chamber for Rats





Floor texture examples

## Context Floors

Further upgrade options include 5 context changing floors for the OPC / WWW episodic memory task. Tactile textures include smooth, textured, ribbed rubber, pattern rubber, and holes.

It has been shown that when the rodent feels the tactile floor under its feet, it was a **more powerful context change than any visual stimulus.** (Dalrymple -Alford)

## ABET II Software and Multiple Chamber Connections

Using the Lafayette Instrument experiment designing software, ABET II, multiple chambers can be connected as a set and programmed for auto-habituation and running the NOR-OL-OPC Tasks.

ABET II offers a system that can be user customized and programmed with no programming experience. **If you can conceptualize your experiment, you can create it!**

Once an experiment has been completed, the ABET data can be exported as comma separated values for further interpretation and study.

## Scoring multiple trial sessions - even from multiple chambers

A camera for scoring the trails is supplied with the 'ChamberView' and 'ChamberScore' App with download of the 16 episodes of object exploration as a .csv file. **The software enables the user to view each video phase sequentially** and mark the bouts of exploration with L and R markers for the novel and familiar objects.

The discrimination ratio (D2) then can be calculated cumulatively over 16 trails in a single 2 hour session.



View of Chamber with camera

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