Novel Object Recognition Test

What is it?

The novel object recognition test (NOR) test is a two trial cognitive paradigm that assesses visual recognition memory. A recognition memory task allows the comparison between presented stimuli and previously stored information. Recognition memory is disturbed in a range of human disorders and NOR is widely used in rodents for investigating deficits in a variety of animal models of human conditions where cognition is impaired.

How does it work?

Following initial habituation to the empty test arena, the test consists of two trials. In the first trial, the rats are exposed to two identical objects in an open arena (acquisition phase). In the second trial, following an interval (1 min – 6h, depending on the type of memory and brain region of interest), rats are exposed to two dissimilar objects, one familiar object from the first trial and one novel object (retention phase, see Figure 1). Object recognition can be measured as the difference in time spent exploring the familiar and the novel object. Behaviour is recorded and scored using an NOR scoring timer by a trained experimenter who is blind to the treatment groups.

Acquisition trial (identical objects) **Retention trial** (familiar and novel object)

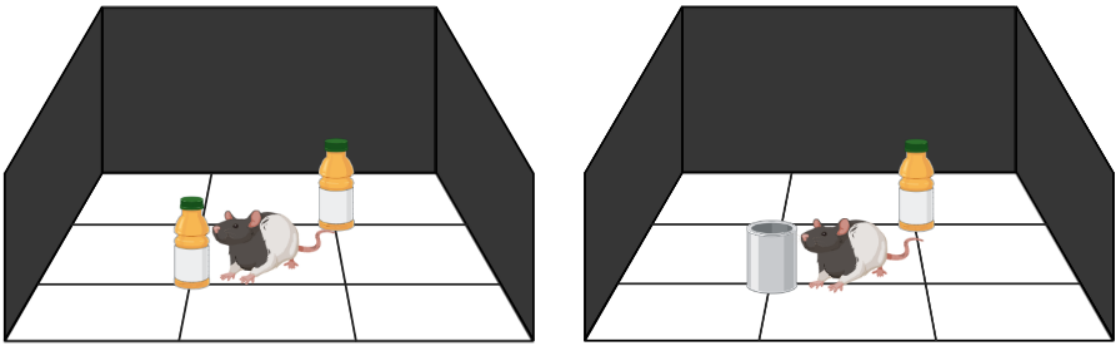

Figure 1: Novel Object Recognition test arena.

Total object exploration time (defined as the duration of time animals spent licking, sniffing, or touching the object but not including time spent standing or sitting on or leaning against the object) is recorded for each of the familiar and novel objects in the acquisition and retention trials. Discrimination index (defined as the difference in time spent exploring the novel and the familiar objects divided by total time spent exploring both objects) and locomotor activity (defined as movement, measured by the number of lines crossed in both trials) are also calculated.

Rats (and mice) have been shown to spend more time exploring the novel object in the retention phase.

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The effect of subchronic Phencyclidine (scPCP) in the NOR test

The b-neuro laboratory have demonstrated a selective, long lasting and robust deficit in this task induced following the scPCP treatment regimen. The deficit is only observed in the retention phase of the task where scPCP treated animals spend a similar amount of time exploring the familiar and novel object (See Figure 2), suggesting a specific and relatively subtle cognitive impairment. Behaviour in the acquisition phase of the test (and locomotor activity) is unaffected by scPCP treatment. The effects of scPCP in this paradigm may represent a selective deficit in visual recognition memory which is known to be impaired in schizophrenia and other CNS disorders.

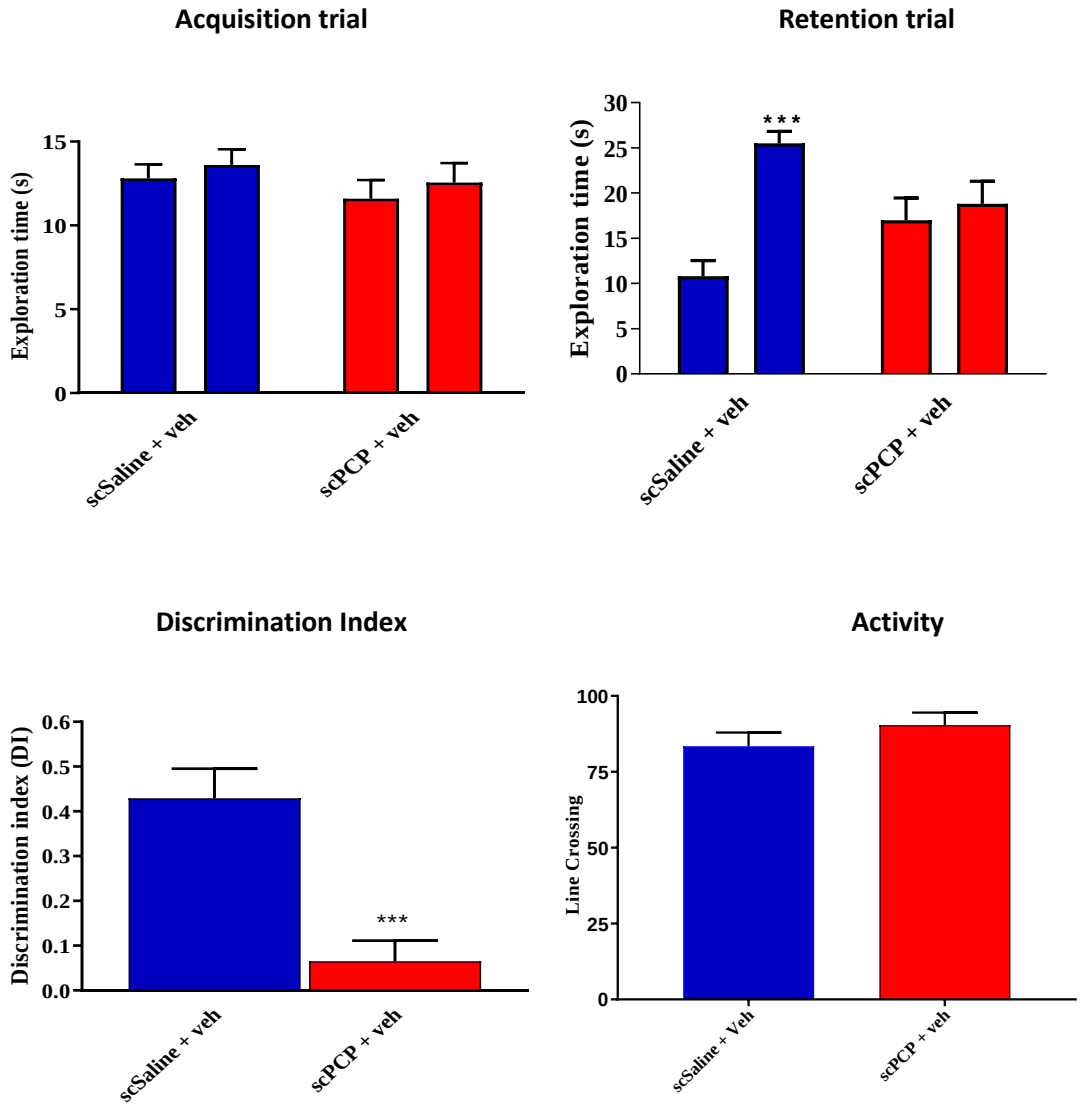

Figure 2: Object exploration times (secs) for each of the identical, familiar and novel objects are presented for the acquisition and retention phase. A discrimination index for the retention phase and total locomotor activity for the test are also shown.

Novel Object Recognition Test

Reversal of the scPCP NOR deficit by a reference compound.

The NOR test is extremely useful for identification of the cognitive deficits observed in a variety of animal models for human CNS disorders, for assessing their neural basis, and testing the efficacy of novel therapeutic agents to enhance cognition in a variety of disease states. At b-neuro we have demonstrated the ability of a range of compounds in this paradigm. Reproducibility and validation data can be shared upon request. We work with clients to pick the most relevant reference compound.

Retention trial

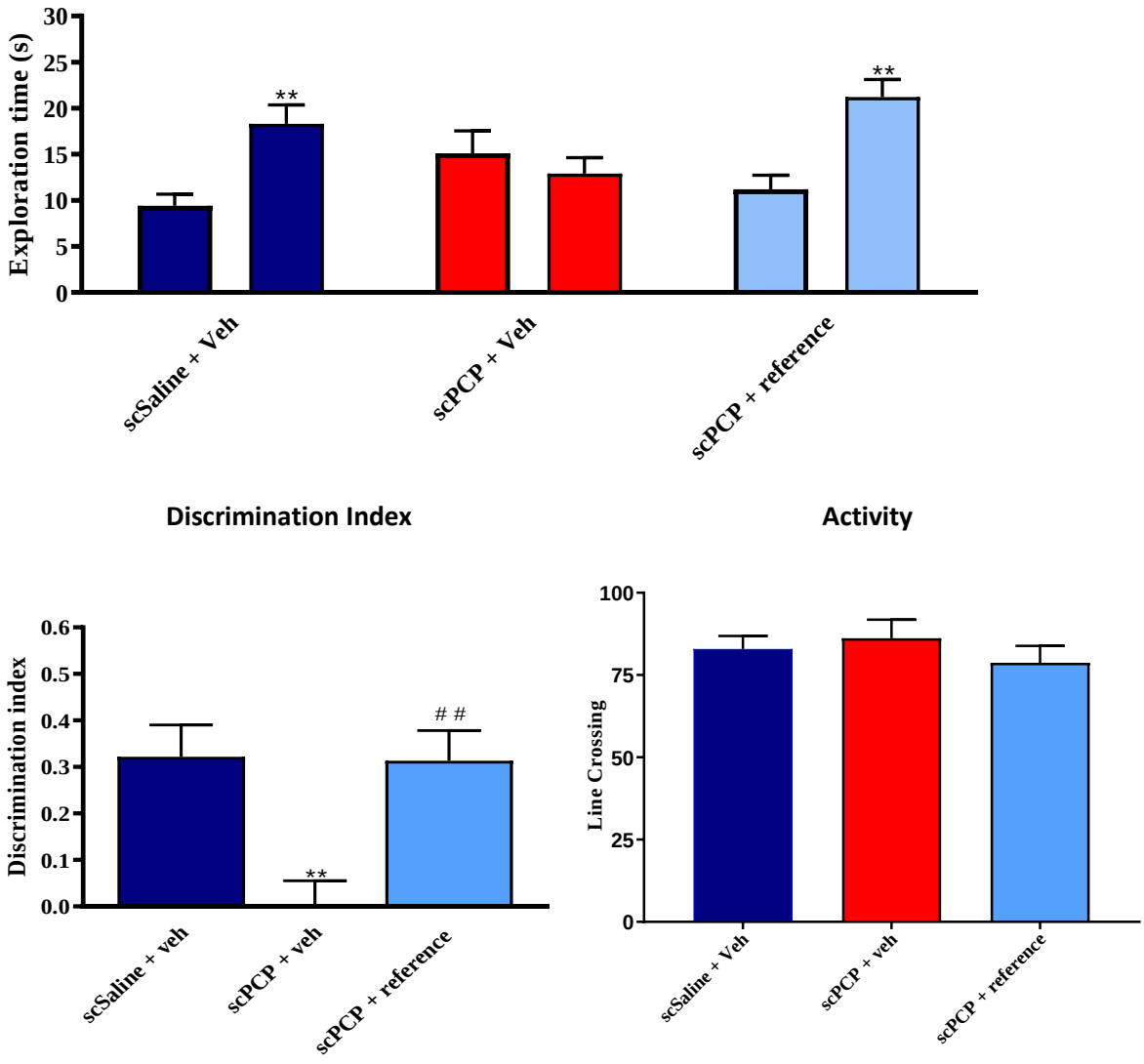

Figure 3: Object exploration times (secs) for the familiar and novel objects are presented for the retention phase for scSaline + Veh, scPCP + Veh and scPCP + compound groups. A discrimination index for the retention phase and locomotor activity for the test are also shown.

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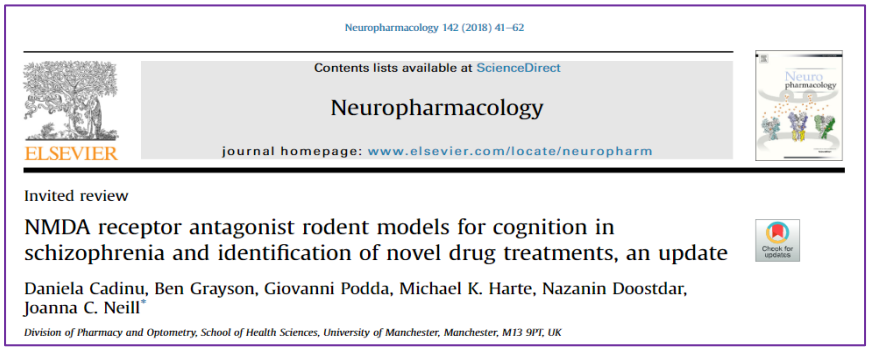
For further information, please see review articles below.

Cadinu D, Grayson B, Podda G, Harte MK, Doostdar N, Neill JC (2017) NMDA receptor antagonist rodent models for cognition in schizophrenia and identification of novel drug treatments, an update. Neuropharmacology; S0028-3908(17)30584-1.


Neuropharmacology 142 (2018) 41–62

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Neuropharmacology

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Invited review

NMDA receptor antagonist rodent models for cognition in schizophrenia and identification of novel drug treatments, an update

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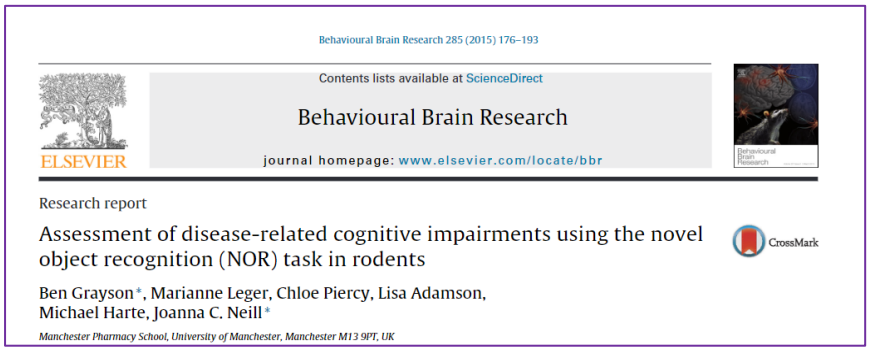
Grayson B, Leger M, Piercy C, Adamson L, Harte M, Neill JC (2015) Assessment of disease-related cognitive impairments using the novel object recognition (NOR) task in rodents. Behavioural Brain Res. 285:176-93.


Behavioural Brain Research 285 (2015) 176–193

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Behavioural Brain Research

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Research report

Assessment of disease-related cognitive impairments using the novel object recognition (NOR) task in rodents

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Neill, JC, Barnes, S, Cook, S, Grayson, B, Idris, NF, McLean, SL, Snigdha S, Rajagopal, L, Harte, MK. (2010) Animal models of cognitive dysfunction and negative symptoms of schizophrenia: focus on NMDA receptor antagonism. Pharmacology and Therapeutics, 128(3):419-32.


Pharmacology & Therapeutics 128 (2010) 419–432

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Animal models of cognitive dysfunction and negative symptoms of schizophrenia: Focus on NMDA receptor antagonism

Joanna C. Neill [a,*], Samuel Barnes [a], Samantha Cook [a], Ben Grayson [a], Nagi F. Idris [a], Samantha L. McLean [a], Shikha Snigdha [b], Lakshmi Rajagopal [a], Michael K. Harte [a]

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