# Usage notes

A summary of how the data were generated is described below. Variables in the dataset are mentioned here (variables marked **bold** and levels of the variable *italic*) but for the exhaustive list and short descriptions see **readme.csv**. To successfully run the R script, make sure that the data is in the location specified in the script (or update the script) and that the R working directory is properly set up (e.g. at the location of the script). Also, ensure that the R packages listed in the scripts are installed.

# Data generation

The experiment lasted for 16 months (May 2020 – September 2021) and was conducted in five independent **batches**. Female laboratory mice of strains C57BL/6J were obtained from a professional breeder at the age of eight weeks and housed at the University of Münster. Mice were housed in groups of two individuals per **cage (**with bedding, paper towel, nestlet, wooden stick, cardboard house, and plastic tunnel). Each mouse had a unique identifier (**id**). Individuals were separately trained ad tested in the (cognitive) judgment bias test (JBT/CJB) and environment choice test (ECT). Batches had slightly different experimental designs:

Batch 1-3

* Only one mouse per cage participated in the tests
* Two **treatment** groups: *control* and *enrichment removal*
  + Enrichment removal: a cage with bedding and red plastic tunnel only
* Two judgment bias tests (**cjb\_type**): touchscreen (*ts*) and *tunnel* paradigm
* One source of rat bedding in the ECT test: *internal*

Batch 4-5

* Both mice from the same cage participated in the tests
* No treatments: only the “*control*” group
* Only *touchscreen* paradigm for JBT

## Judgment bias test (JBT/CJB)

In the JBT phase, mice were first trained and tested in one of the two JBT paradigms (**cjb\_type)**. To successfully learn the paradigm, mice needed to nose-poke one side of the apparatus in response to a “positive” cue to receive a larger reward and the other side in response to the “negative” cue, to receive only a smaller reward. The side with the larger reward was counterbalanced between mice (**cjb\_side\_big\_reward**): for some mice, the correct response for the positive cue was to nose-poke a right-hand side, whereas for the others, left-hand window (and the opposite for the negative cue). As individuals needed different numbers of training sessions before the test (**cjb\_training\_duration**), they were tested on different dates (**cjb\_test\_start**). Not all individuals reached the test (**cjb\_test).**

To characterise individuals as more optimistic or pessimistic, responses from the ambiguous cue in the JBT were used and the “optimism” score for each individual from five testing sessions was calculated.

In addition to three ambiguous cues, the data set includes “optimism scores” also for the reference cues, where correct responses substituted optimistic responses and incorrect substituted pessimistic responses.

Reference and ambiguous **cues:**

* **P** = “positive” and **N** = “negative” cue
  + The number of cue presentations for calculating the score:
    - touchscreen paradigm = 118
    - tunnel paradigm = 68
* **M** = “middle”, **NN** = “near negative”, and **NP** = “near positive” cue
  + The number of cue presentations:
    - touchscreen paradigm = 10
    - tunnel paradigm = 5

For the touchscreen paradigm, data were automatically recorded by the ABET II software (version 2.20., Campden Instruments Ltd., Loughborough, Leics., UK) and processed in R to calculate an individual’s optimism score. For the tunnel paradigm, data was recorded by observation and processed in Microsoft Excel. Data from both tests were merged and used to generate the following datasets:

* All **cues** in one column: long format)
  + **JBT\_all.csv**
* Each **cue** in a separate column: wide format (with ECT data)
  + **JBTxECT\_id.csv**
  + **JBTxECT\_day.csv**
    - Individual’s optimism score triplicated over three sessions(days) of ECT

## Environment choice test (ECT)

In the ECT phase, mice were trained and tested in the ECT where they could choose to go through a chamber with predator cues and obtain a large reward or through a safe chamber with clean bedding and obtain only a small reward. As individuals needed different numbers of training sessions before the test (**ect\_training\_duration**), they were tested on different dates (**ect\_date\_start**).

The side of the predator/safe chamber (and big/small reward) was consistent for each mouse but was counterbalanced across mice (**ect\_side\_dangerous;** it matched the side of the reward that individual had in the JBT). As predator cues, rat bedding and bright light were used. Two different sources of rat bedding were used (**rat\_bedding**): *our/internal*  bedding was collected from male lister hooded rats housed at our Department for Behavioural Biology. In contrast, e*xternal* bedding was collected from both male and female Wistar rats housed at the Münster University Hospital.

Testing consisted of three sessions (**ect\_session**) performed on three consecutive days (**ect\_date**). Each session consisted of ten trials. In each trial mice needed to make either the risky choice by going through the predator (*dangerous*) **chamber** and claiming a large reward, or the safe choice by going through the *safe* **chamber** but claiming only a small reward (**count\_big\_reward** = number of risky choices). Based on these choices, we calculated the choice score for each individual:

In addition to the choice score, the behaviour of mice was recorded. The following behavioural measures were recorded separately for the two chambers.

* number of **retractions** from the chamber
* **entries** into the chamber
* **duration** in the chamber (time spent)
* **digging** in the chamber

Behaviours were adjusted for the number of observed trials and the number of entries to the respective chamber. To compare the entries that better approximate increased exploration/activity, we included only the entries that did not lead to the reward choice, that is, additional entries (if entries leading to the reward choice were included, differences in entries between the two chambers could reflect just the differences in reward choices).

ECT data were recorded from recorded videos by manual behavioural software BORIS (version 8.0.9) and processed in R. Data was used to generate the following datasets:

* Behavioural measures recorded in the predator and safe chamber
  + **ECT\_chambers.csv**
* Choice score
  + **JBTxECT\_id.csv**
    - One score per individual based on 30 trials from three sessions
  + **JBTxECT\_day.csv**
    - Three scores per individual, one for each session based on 10 trials

# Data sets

The four different datasets generated from JBT and ECT were used to address different research questions:

**ECT\_chambers.csv** contains data used to compare the response of mice to the predator and safe chamber (dangerous) in the ECT

**JBT\_all.csv** contains data used to analyse the response of mice in the JBT

**JBTxECT\_day.csv** contains data used to assess the relationship between JBT and ECT as well as the repeatability of the ECT

**JBTxECT\_id.csv** contains data used to assess the repose to predator cues compared to training criteria in ECT as well as to visualise the relationship between JBT and ECT

# R scripts

The analysis is separated into different R scripts:

**Stats\_figures\_ECT.R** contains the R code used to analyse and visualise the behavioural response of mice in the ECT. Loads dataset ECT\_chambers.csv and JBTxECT\_id.csv.

**Stats\_figures\_JBT.R** contains the R code used to analyse and visualise the response of mice in the JBT. Loads the dataset JBT\_all.csv.

**Stats\_figures\_JBTxECT.R** contains the R code used to assess the relationship between JBT and ECT as well as the repeatability of the ECT. Loads dataset JBTxECT\_day.csv and JBTxECT\_id.csv.