Supplemental Information

Threat history controls flexible escape behavior in mice

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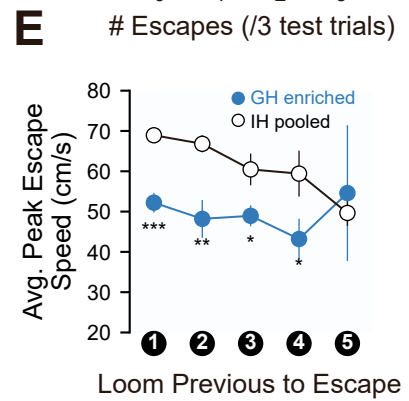
A

Enriched pen

food source
water source
wooden ball
square shelter
running wheel
mouse (x20) or (x1)
log
bridge

1m

1m

B

Group housed, enriched pen

No reaction
Freeze
Escape

Position Along Arena (cm)

Time

1s

Individually housed, enriched pen

No reaction
Escape

Position Along Arena (cm)

Time

1s

C

Escape Probability (%)

26/45
17/18
59/60

**

***

GH Enriched
IH Enriched
IH IVC (1 mth)

D

% Mice

GH enriched
IH enriched
IH IVC (1 mth)

Escapes (/3 test trials)

0   1   2   3

E

Avg. Peak Escape Speed (cm/s)

GH enriched
IH pooled

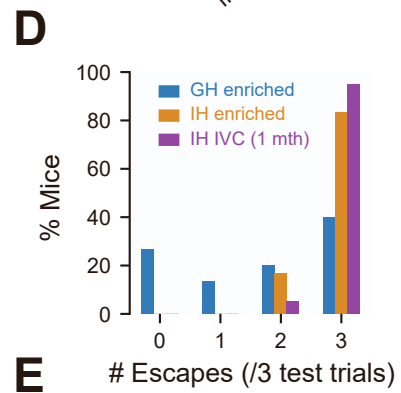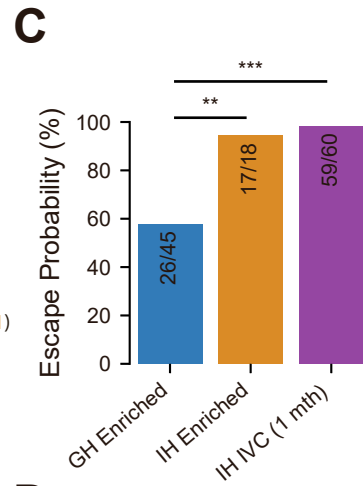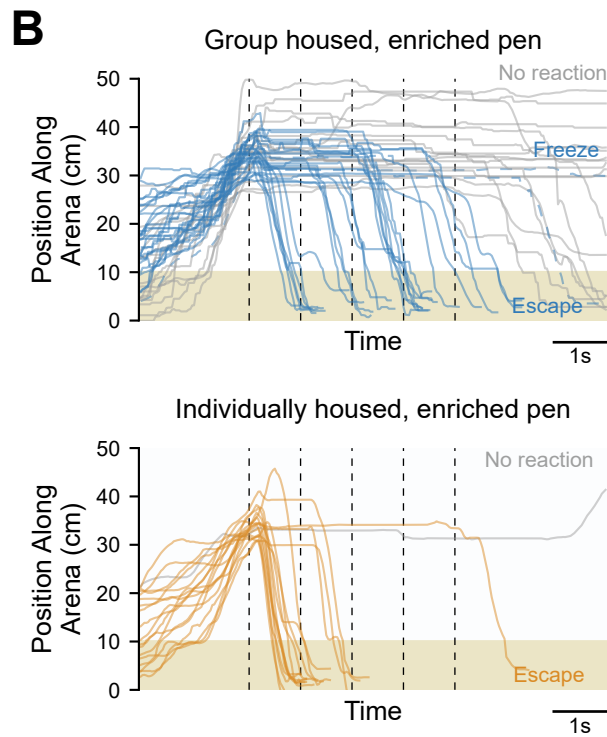***   **   *   *
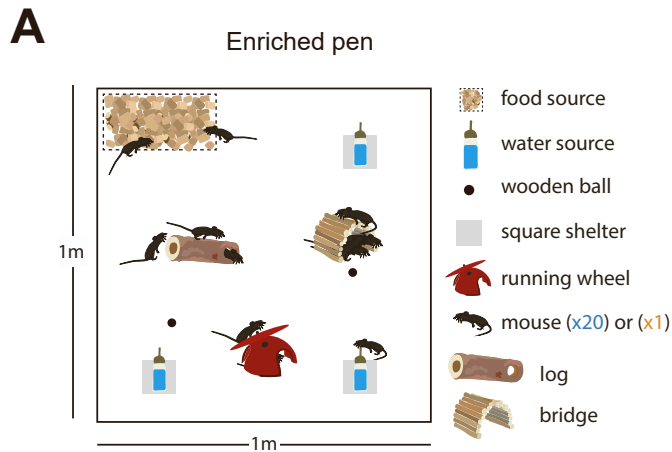
❶   ❷   ❸   ❹   ❺

Loom Previous to Escape

Figure S1: Unreliable escape behaviour in group housed mice. Related to Figure 1. A) Schematic illustrating the large environmentally enriched pen in which mice were either individually housed or housed as a group (n = 20) for at least 28 days before testing. **B**) Top: population data showing positional traces of all trials for all group housed mice (traces are classified as escape (solid line), freezing (dashed line) or no reaction (solid grey line). Bottom: population data showing positional traces of all trials for all individually housed mice. **C**) Overall percentage of trials classified as escape according to housing condition. ** and *** indicate p-values of less than 0.01 and 0.001 respectively. **D**) Percentage of mice which escaped to 0, 1, 2 or 3 of the three test trials, shown for each experimental group. **E)** The mean peak speed for all escape trials grouped by the most recent looming spot preceding escape initiation for group housed and isolated mice (pooled with individually housed IVC conditions). *, ** and *** indicate p-values of less than 0.05, 0.01 and 0.001 respectively. Error bars indicate standard error of the mean (SEM).
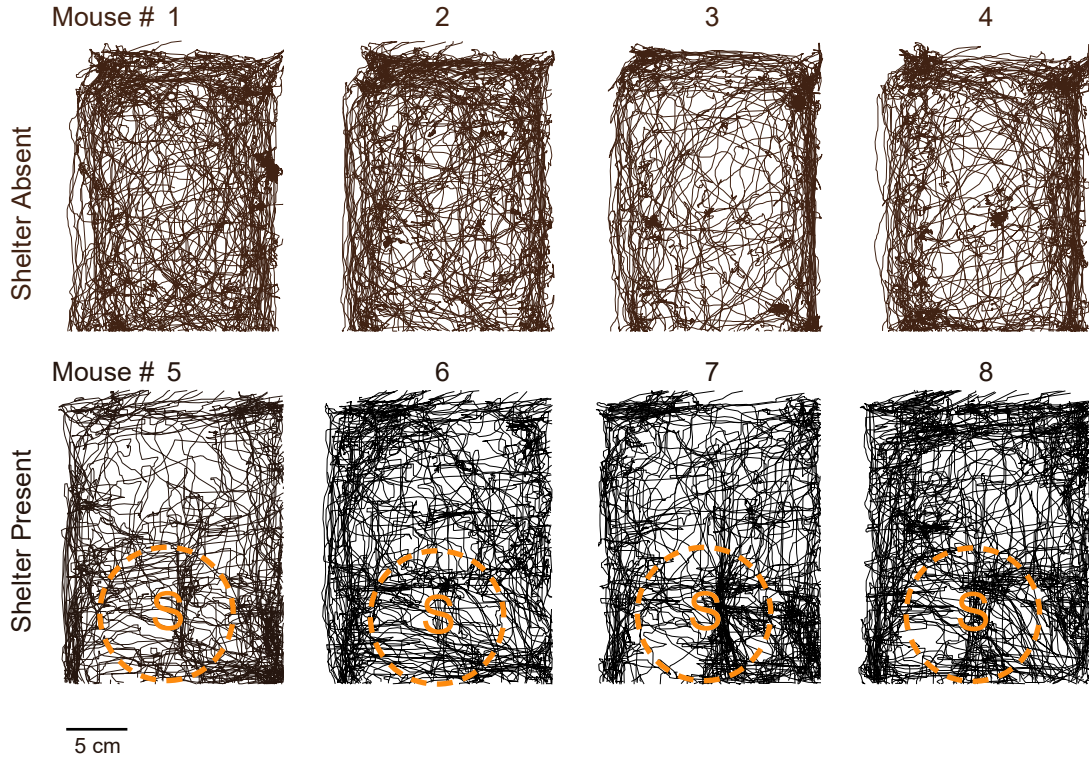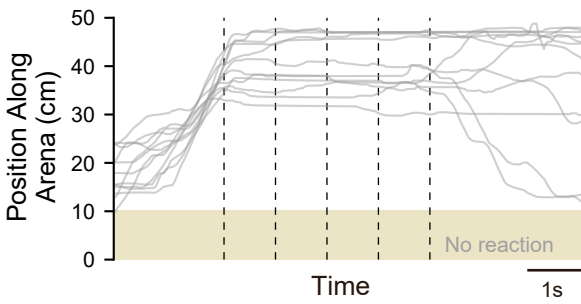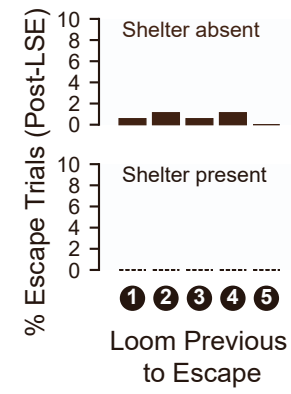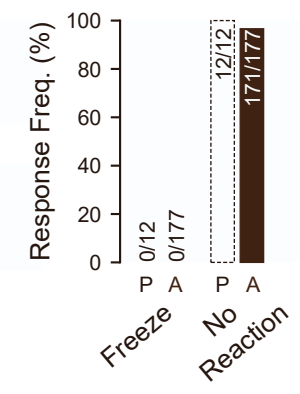
A

Mouse # 1   2   3   4

Shelter Absent

Mouse # 5   6   7   8

Shelter Present

5 cm

B

Position Along Arena (cm)

50
40
30
20
10
0

Time   1s

No reaction

C

% Escape Trials (Post-LSE)

Shelter absent

10
8
6
4
2
0

Shelter present

10
8
6
4
2
0

① ② ③ ④ ⑤

Loom Previous to Escape

D

Response Freq. (%)

100
80
60
40
20
0

0/12   0/177   12/12   171/177

P   A   P   A

Freeze   No Reaction

Figure S2: Access to shelter during the LSE protocol does not influence its induction. Related to Figure 2. A) Trajectory plots for four example mice during the LSE protocol when a shelter was absent (brown, top), or present (black, bottom). **B)** Positional traces for all trials from the four mice shown in **A**) (bottom) recorded during the post-LSE test trials. **C)** Bar graphs showing the percentage of trials classified as escape, grouped by most recent looming spot preceding escape initiation for each experimental group. **D)** The percentage of responses classified as freezing or as no-reaction for each experimental group.