Parvalbumin-expressing interneurons in prelimbic cortex regulate social bonding

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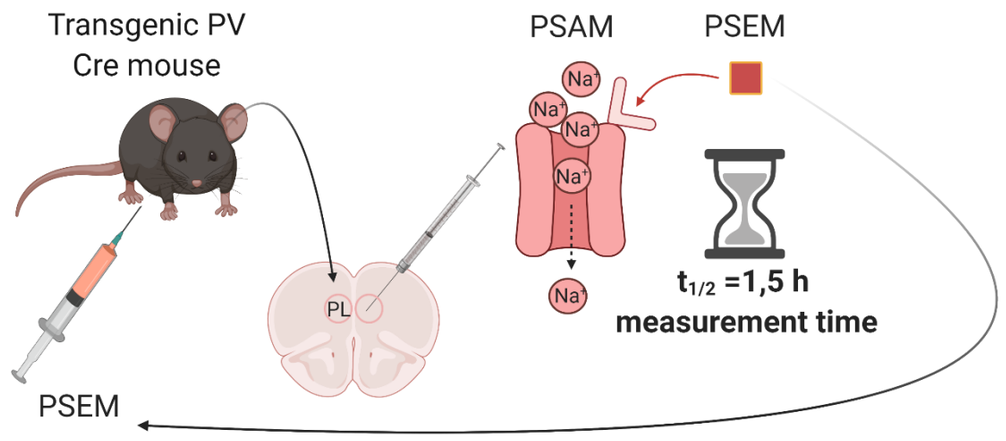
INTRODUCTION

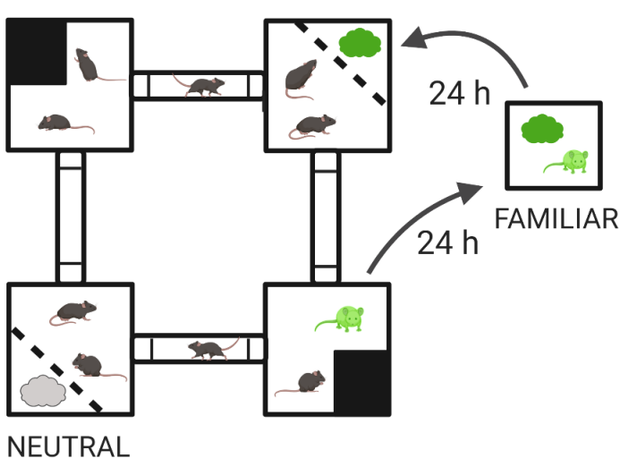
- Little is known about the neural correlates of voluntary social bonds
- Prelimbic cortex (PL) is a key brain structure involved in processing of social stimuli and generating social behavior
- Parvalbumin-expressing (PV+) cells are a prominent type of interneurons in the PL and their activity is closely coupled with excitation of the structure
- Murine sociability can be tested in semi-naturalistic, ecologically-relevant conditions with the use of automated systems: IntelliCage and Eco-HAB

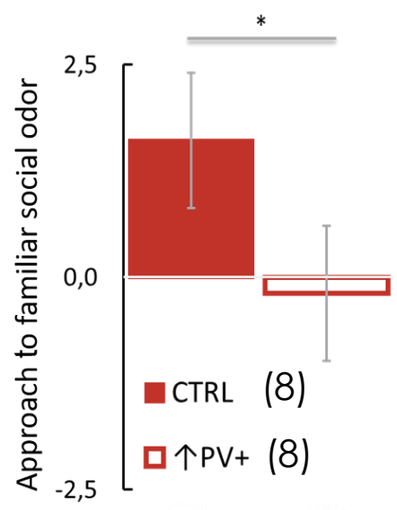
CHEMOGENETIC ACTIVATION OF PV+ NEURONS BY PSEM/PSAM SYSTEM



INTEREST IN FAMILIAR SOCIAL ODOURS IN ECO-HAB

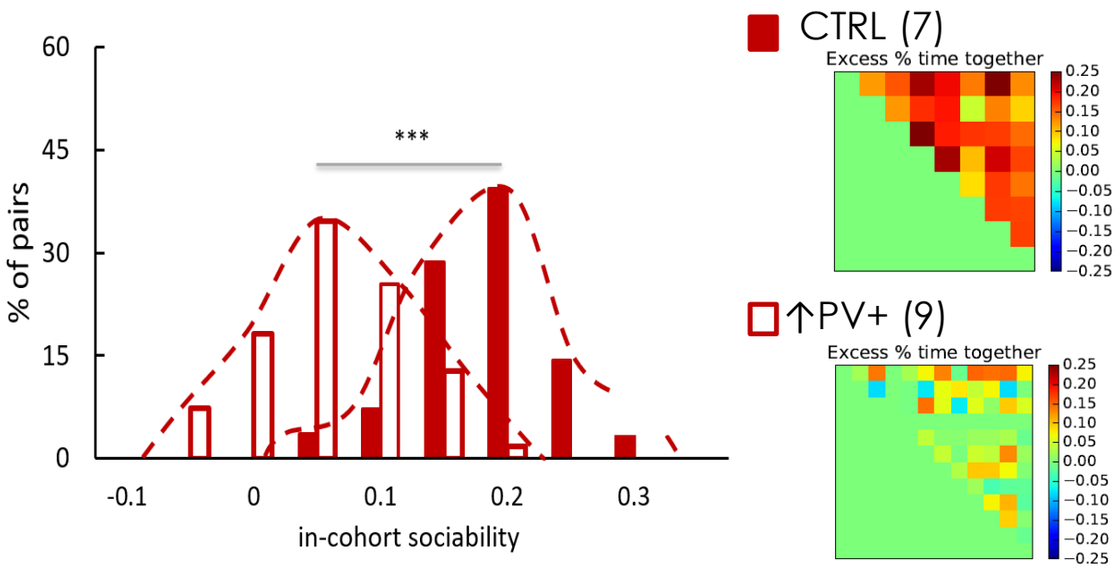
↑PV+ activity in PL = ↓interest in familiar social stimuli





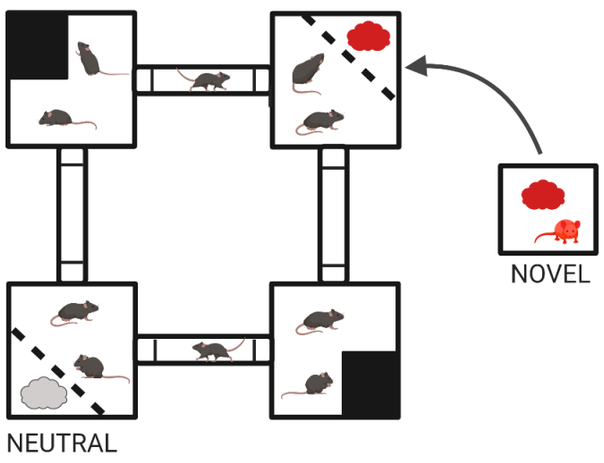
VOLUNTARY SOCIAL CONTACT WITH FAMILIAR CONSPECIFICS

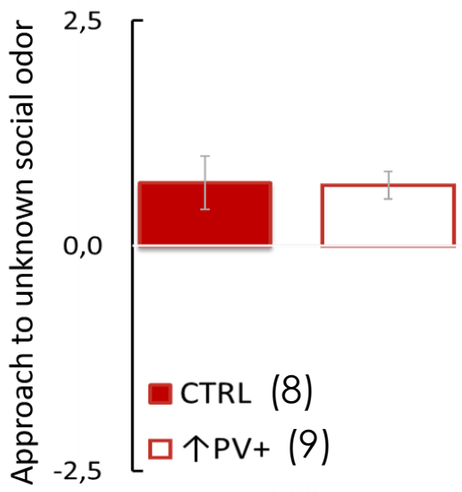
↑PV+ activity in PL = ↓sociability



INTEREST IN UNKNOWN SOCIAL ODOURS IN ECO-HAB

↑PV+ activity in PL = unchanged interest in novel social stimuli

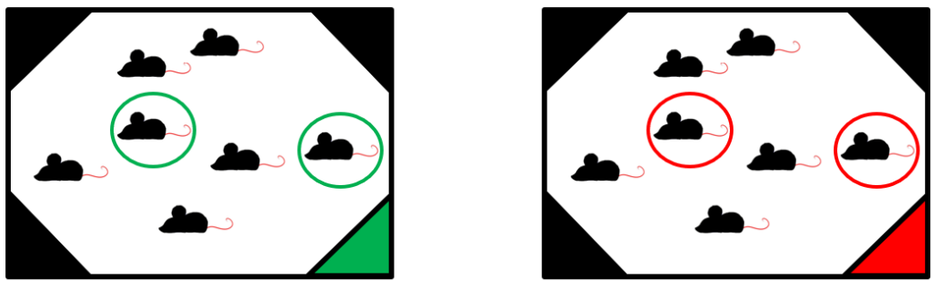




SOCIAL LEARNING IN INTELLICAGES

↑PV+ activity in PL = no impact on social learning

SOCIAL APPETITIVE LEARNING **SOCIAL AVERSIVE LEARNING**

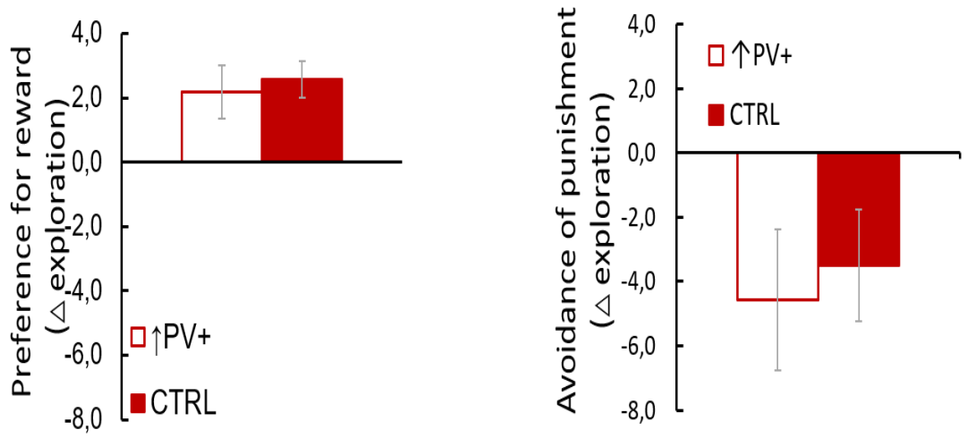


/ demonstrators – mice with access to the reward/punishment

observers – mice with no access to the reward/punishment

↑PV+ (1,5h) = measurement time, when reward/punishment was presented to demonstrators

SOCIAL APPETITIVE LEARNING **SOCIAL AVERSIVE LEARNING**



CONCLUSIONS

- Activity of PV+ neurons in PL regulates social bonding in a robust manner, while having no effect on other forms of social behavior
- Artificial activation of PV+ cells in PL leads to:
  - ↓ time voluntarily spend together with cage mates
  - ↓ interest in familiar social odours
- However, it does not impact:
  - Interest in novel social odours
  - Social learning

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