

A New Rodent Model to Study Empathy

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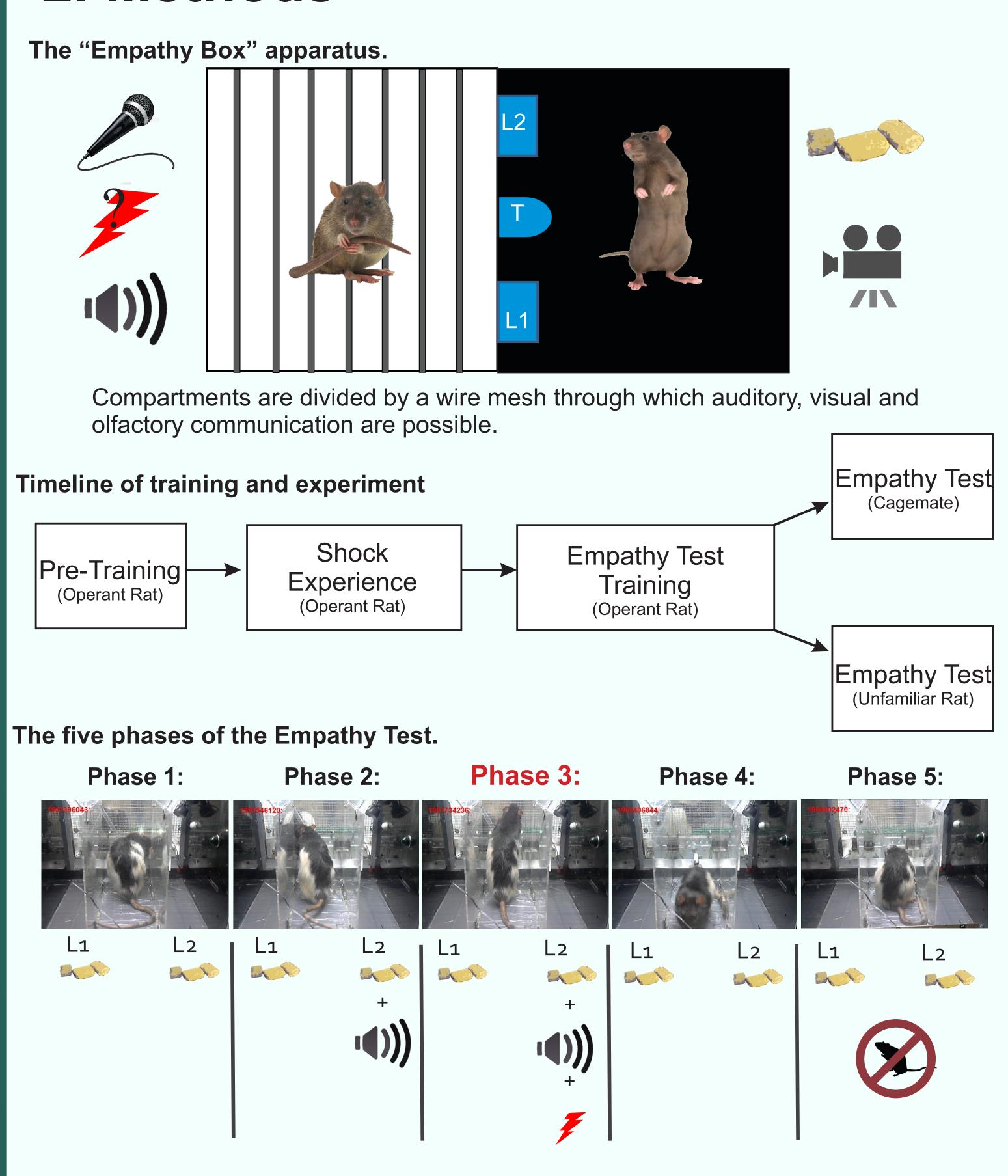
Shock Non-Shock



1. Introduction

- Empathy: an affective response stemming from the understanding of another individual's emotional state which allows one to respond to social stimuli with appropriate pro-social behaviors (1).
- Accumulating evidence indicates that emotional contagion (a basic form of empathy) exists in rodents (2). Rats are capable of sharing states of fear (3) and acting prosocially (4).
- In this study we investigated whether rats can further display empathy-like behavior in response to a distressed conspecific and if this display may differ depending on whether the conspecific is a cagemate or an unfamiliar rat.

2. Methods



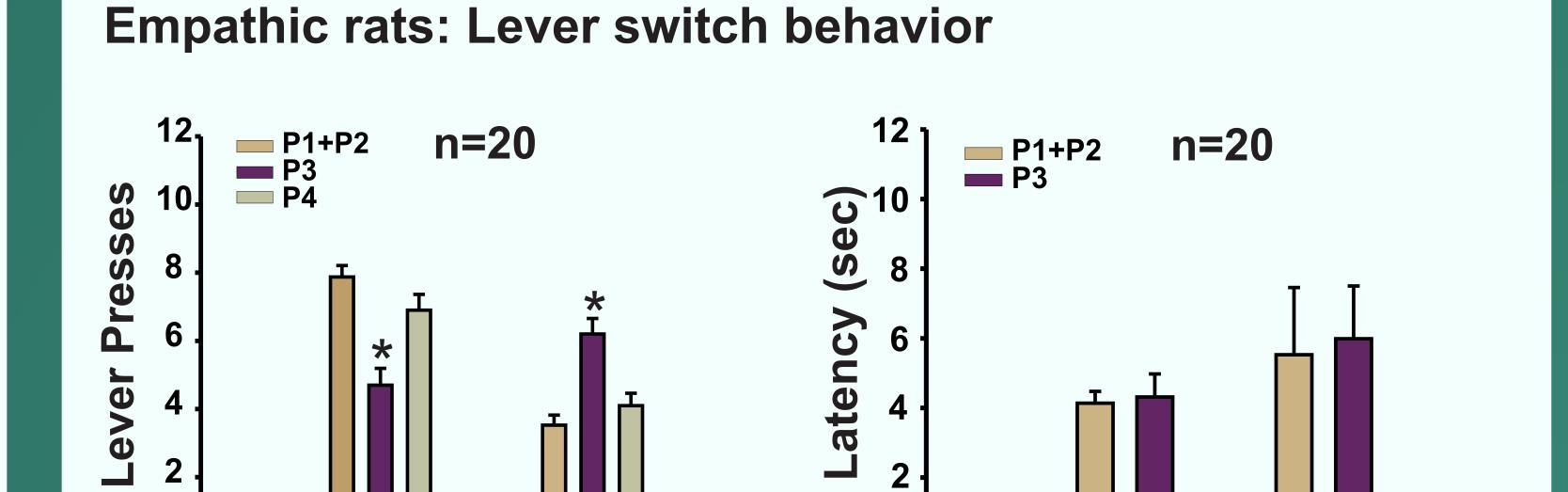
Avoidance

Grooming

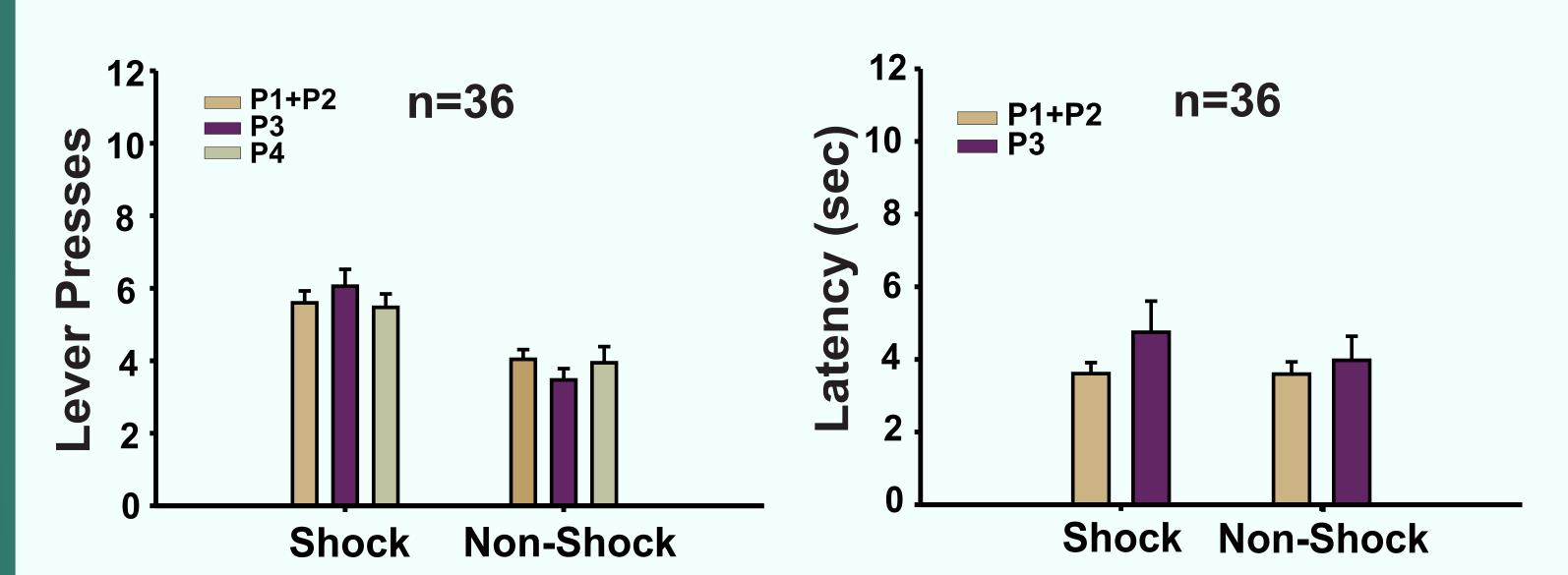
Observable behaviors during the Empathy Test.

Grid Contact

3a. Empathic Behaviors



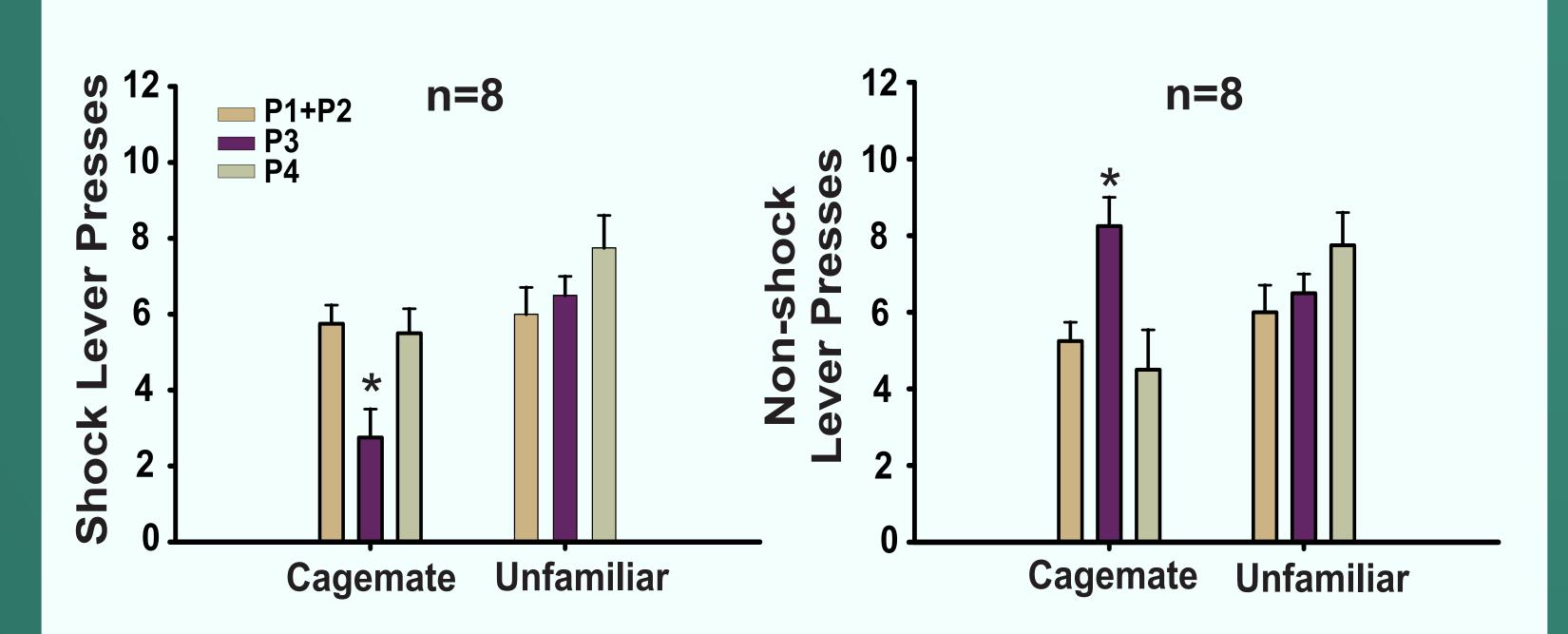
Non-empathic rats



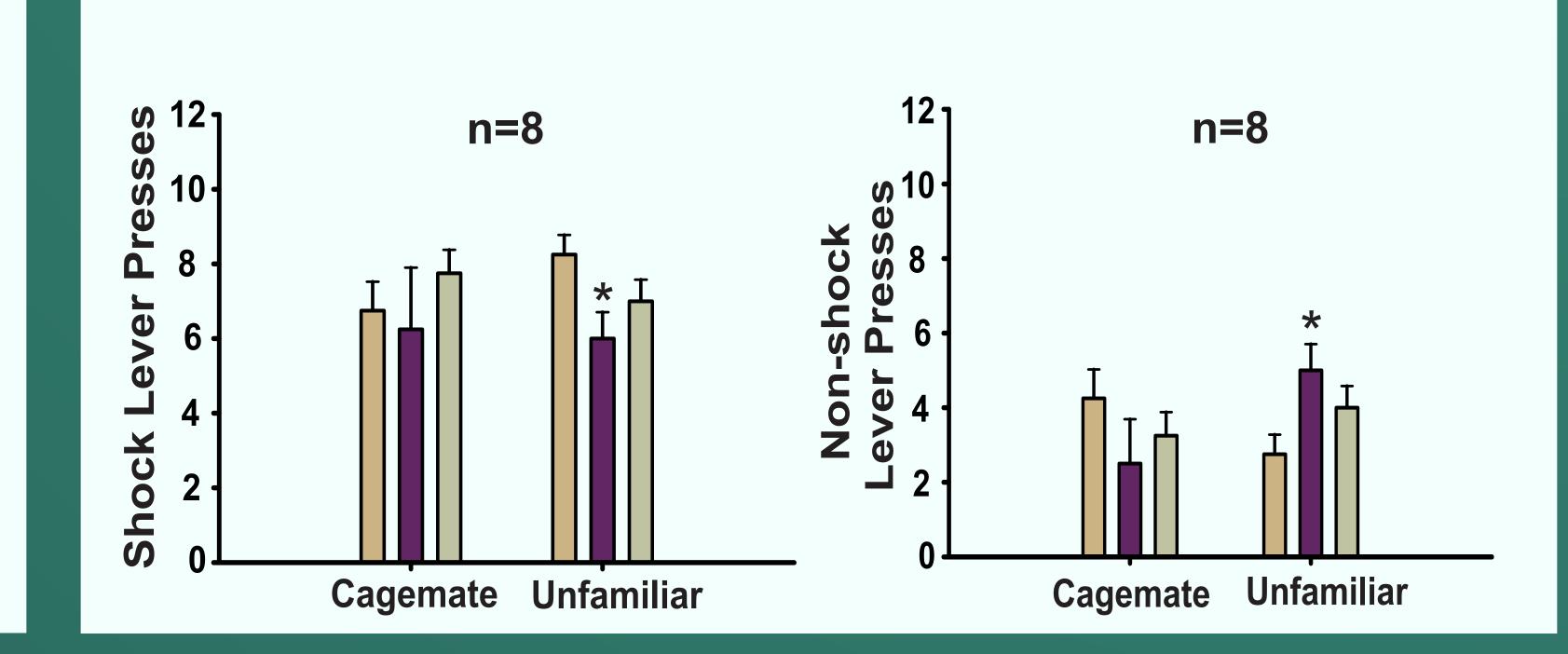
3b. Individual Differences

Non-Shock

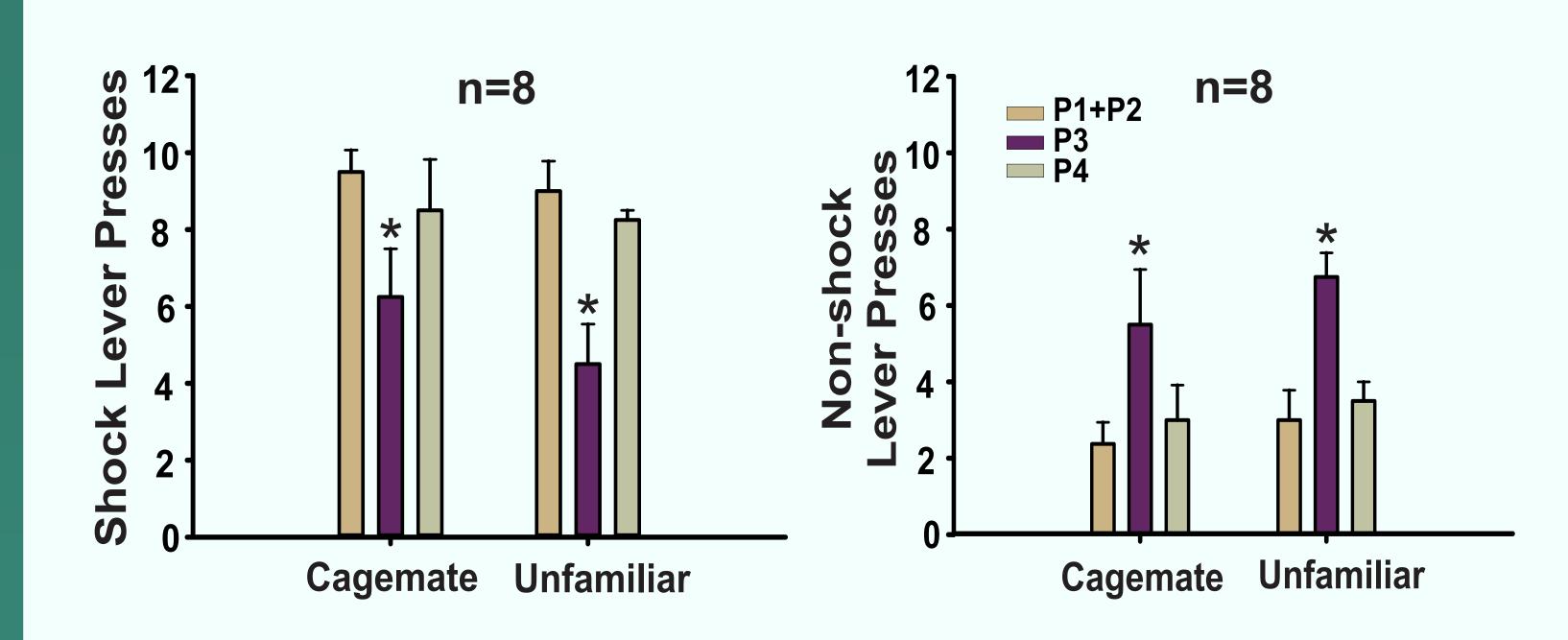
Rat 01: Empathy towards cagemate only



Rat 08: Empathy towards unfamiliar rat only

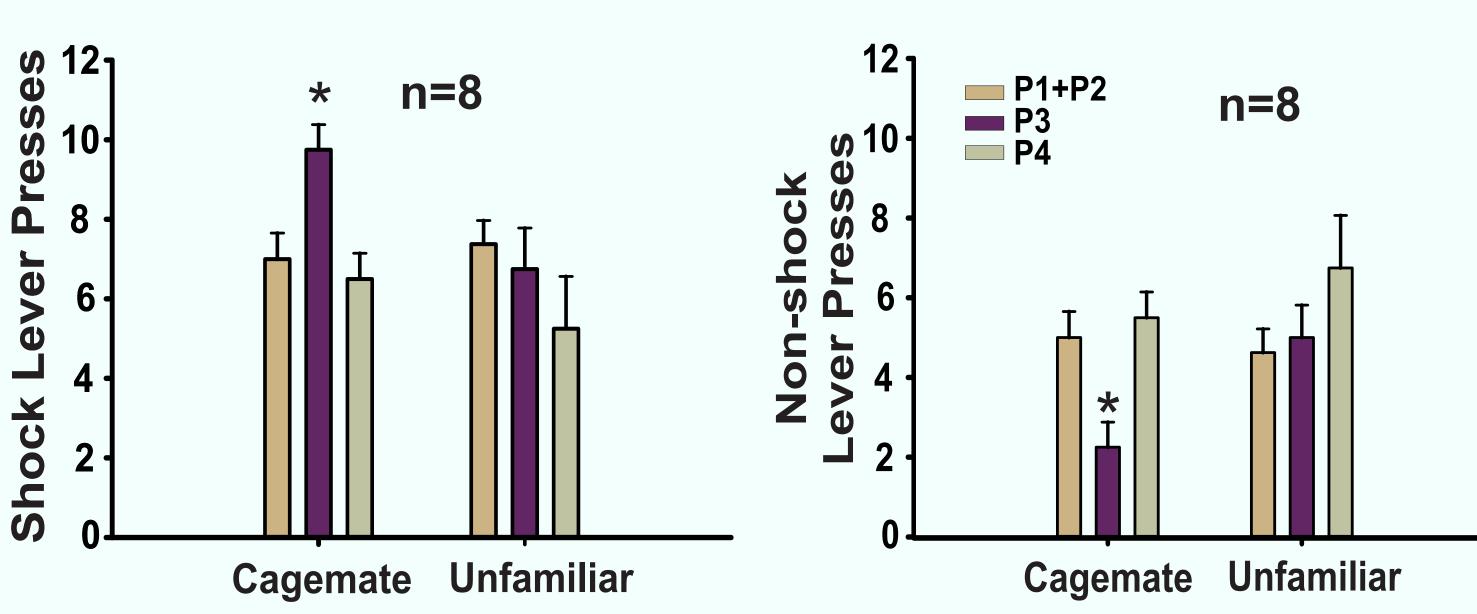


Rat 02: Empathy towards both cagemate and unfamiliar rats



Rat 04: Non empathic rat

Grid Contact



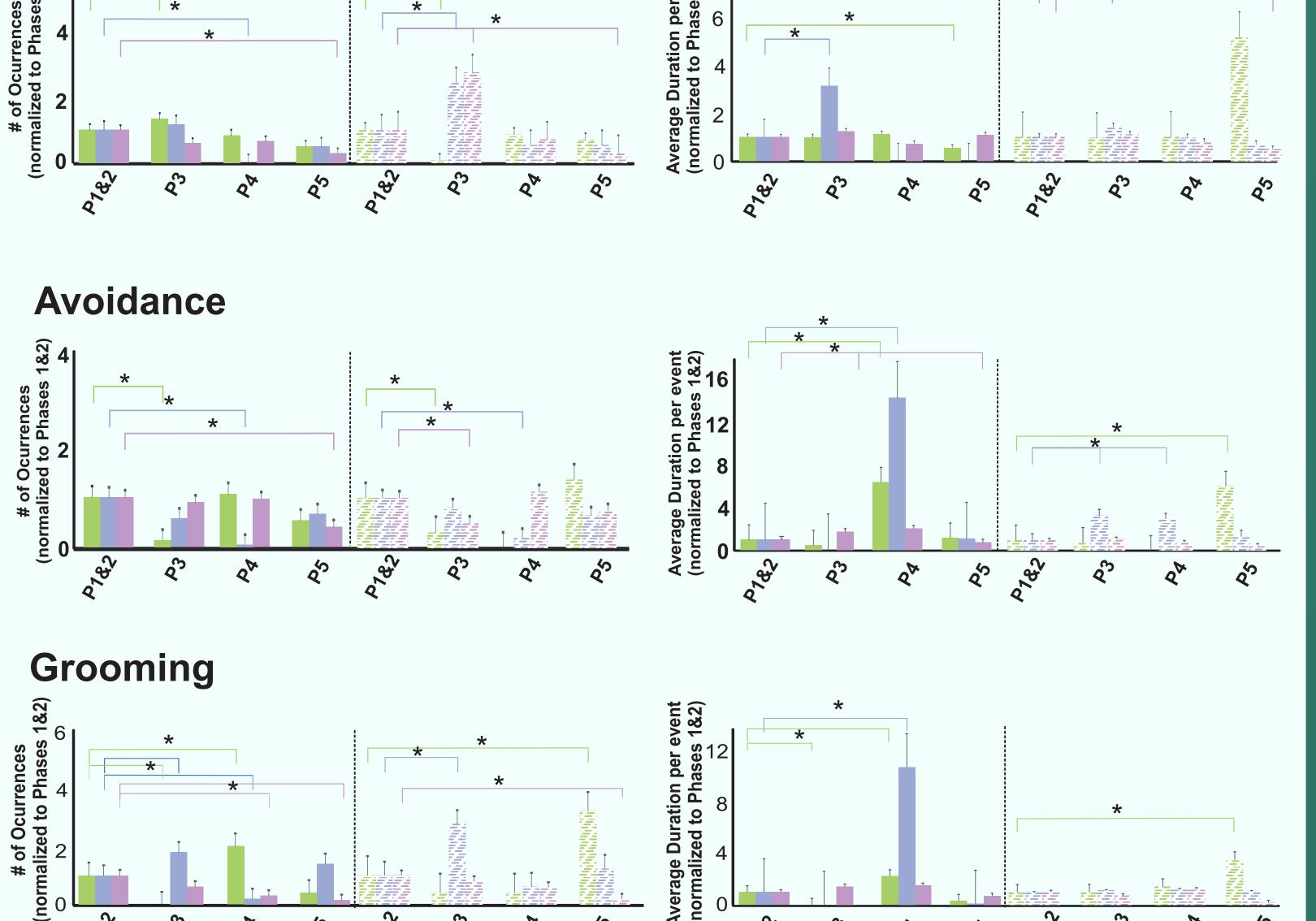
Empathic towards cagemate only

Empathic towards both cagemate and unfamiliar rat

Non-Empathic

Cagemate
Unfamiliar Rat

3c. Behavioral Measures



- attention to their conspecific. - Avoidance duration increases in P4 in empathic animals, indicating long lasting effects of the empathy test (P3).

- Grid contact and avoidance increase only in P3 for empathic animals, indicating increased

- Increase in frequency of grooming in P3 and P4 for empathic animals suggests stress/discomfort.

4. Conclusions

- Rats behave differently depending on social context, indicating that social affiliation may play a guiding role in empathic behavior.
- Some animals show a decrease in lever pressing for both levers regardless of social context, suggesting that they were responsive to the affective state of both the cagemate and the unfamiliar rat.
- Some rats did not show any change in the rate of lever pressing during the test period.
- This model captures some of the natural individual differences observed in human empathy and results are consistent with previous findings that rodents are capable of exhibiting empathy-like behaviors.
- The successful implementation of an operant rodent model of empathy will allow for a wide range of new studies that could be useful for advancing our understanding of the neural basis of empathy.
 - Insular cortex involvement
 - Role of oxytocin
- The results of this research could be used to guide the treatment of mental disorders in which empathy is deficient.

5. References

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6. Acknowledgments

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