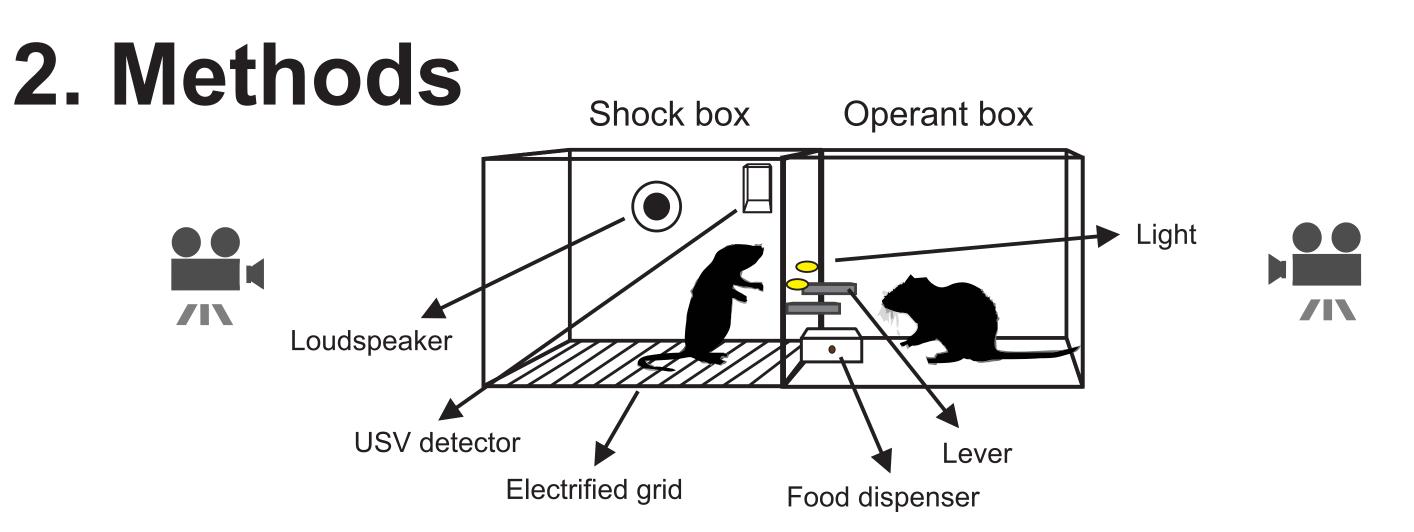




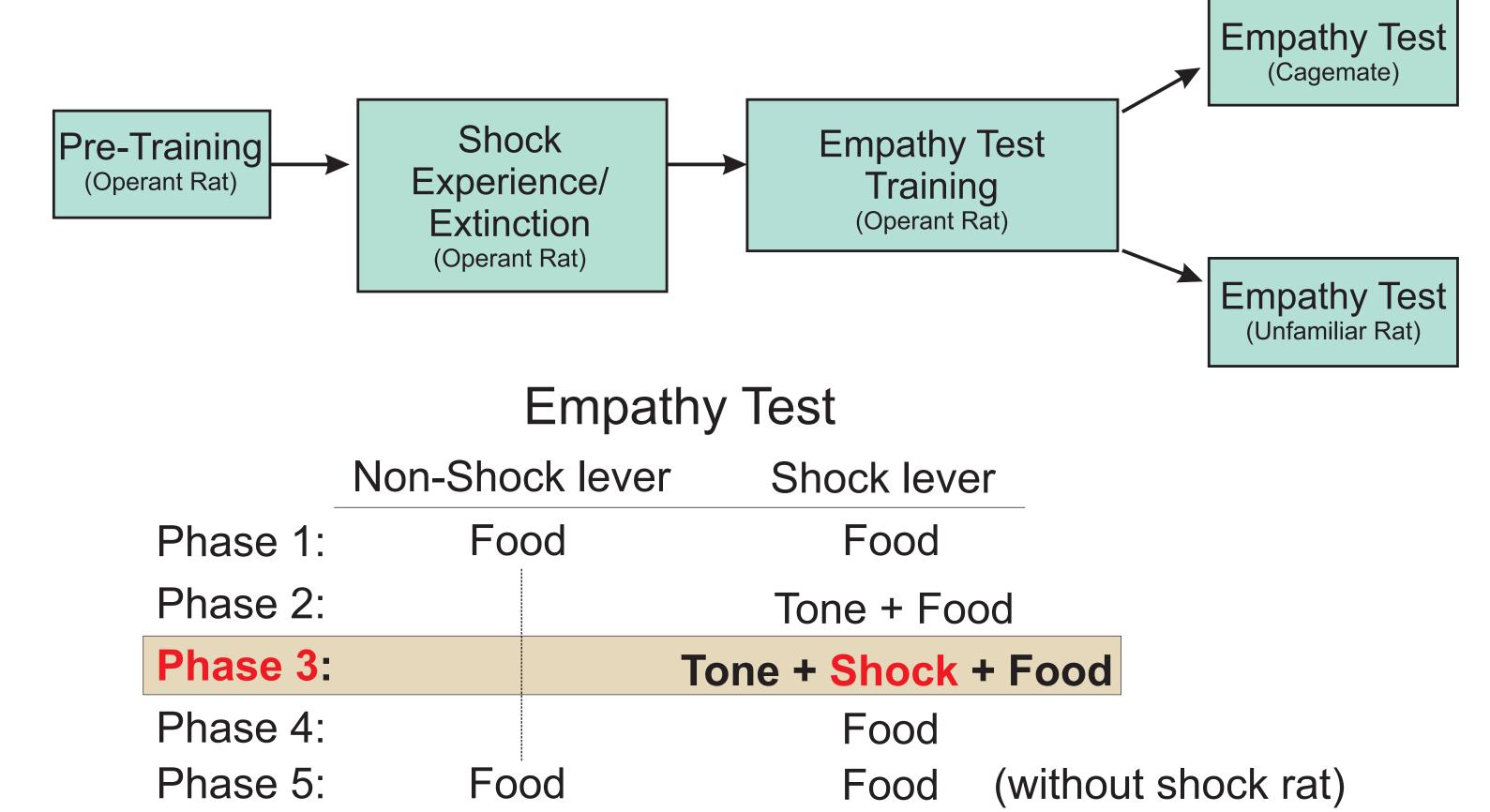
Understanding the Neural Basis of Empathy in Rodents

. Introduction

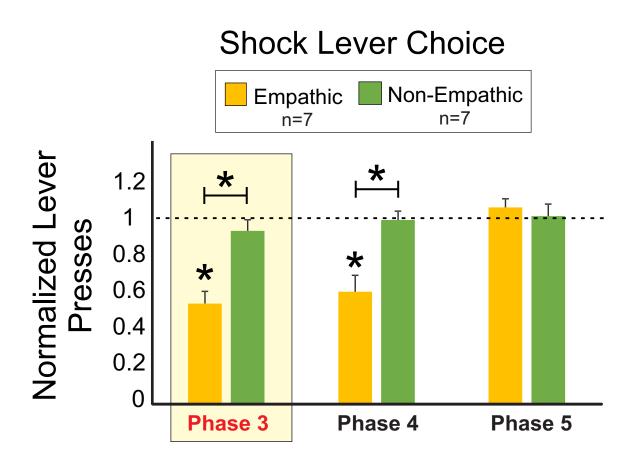
- Rodents can show emotional contagion (a basic form of empathy) (1,2). Rats are capable of sharing states of fear (3) and of acting prosocially (4).
- We have recently shown that rats were capable of exhibiting empathy-like behavior in an operant model (5).
- Rats produce 22 KHz ultrasonic vocalizations (USVs) in response to aversive situations (6).
- Vasopressin (AVP) is known to modulate rat social behavior (7).
- Neuroimaging studies have shown that observing another's distress elicits activity in the anterior insular cortex (AIC) (8).
- We investigated whether rat empathy was triggered by USV playback, modulated by the AVP system, and correlated with neural activity in the AIC.



Compartments are divided by a wire mesh through which auditory, visual and olfactory communications are possible.

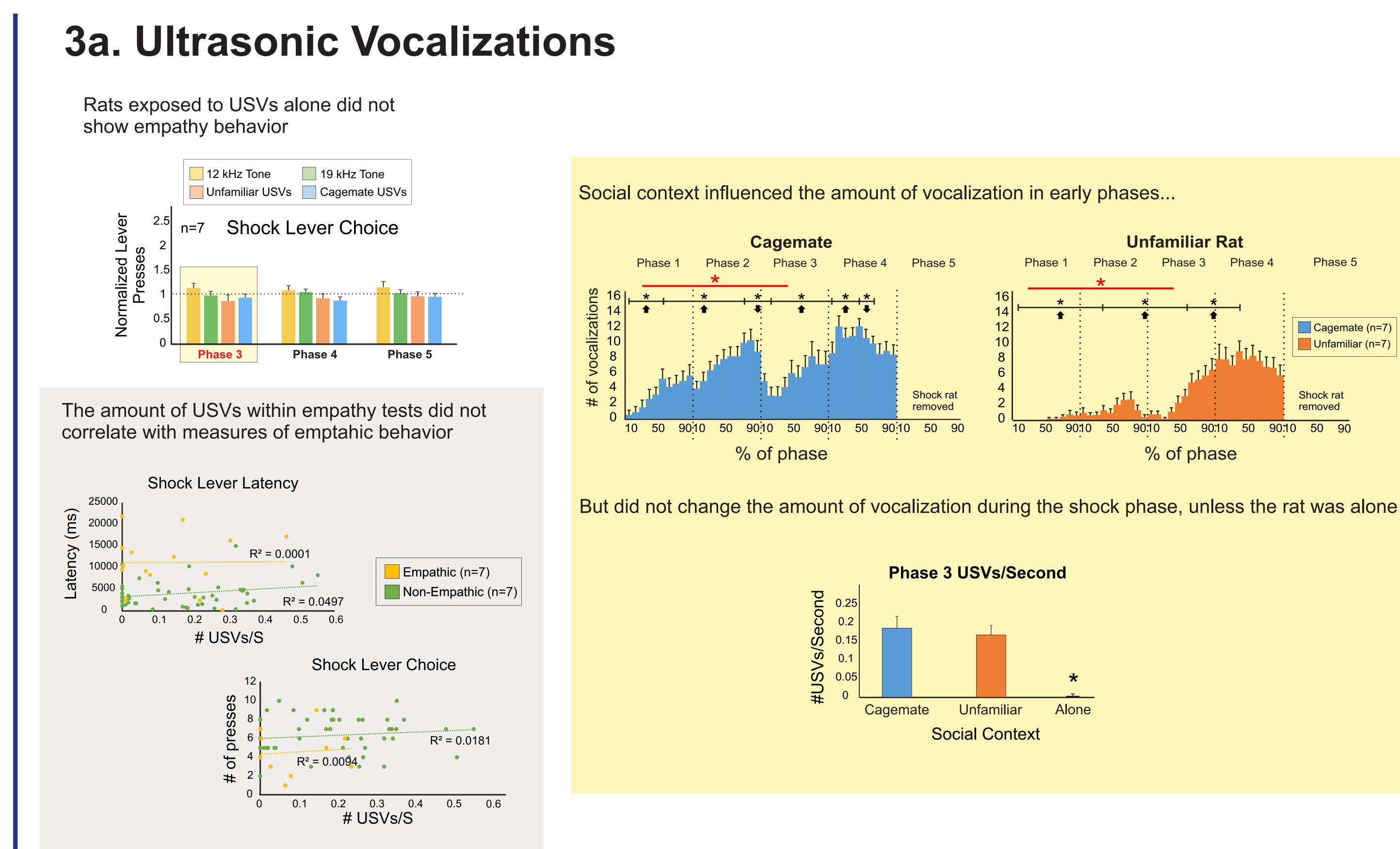


Rats exhibited empathy behaviors (previous findings)

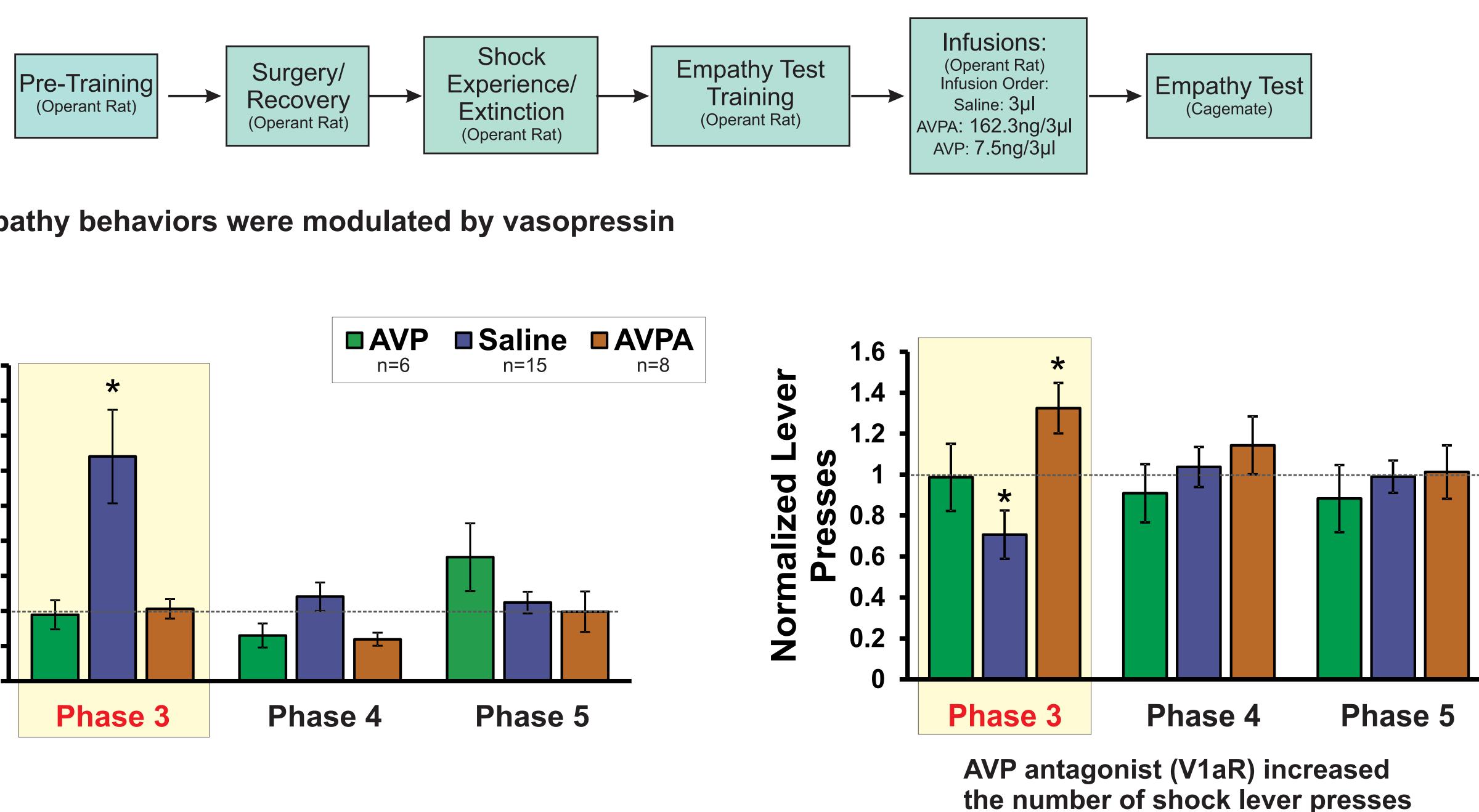


Empathic and non-empathic rats shown differences in operant behavior Contreras, M.¹, Hatfield A.¹, Cummings J.¹, Cruz, K.G.², Fellous J.M.^{1,3}

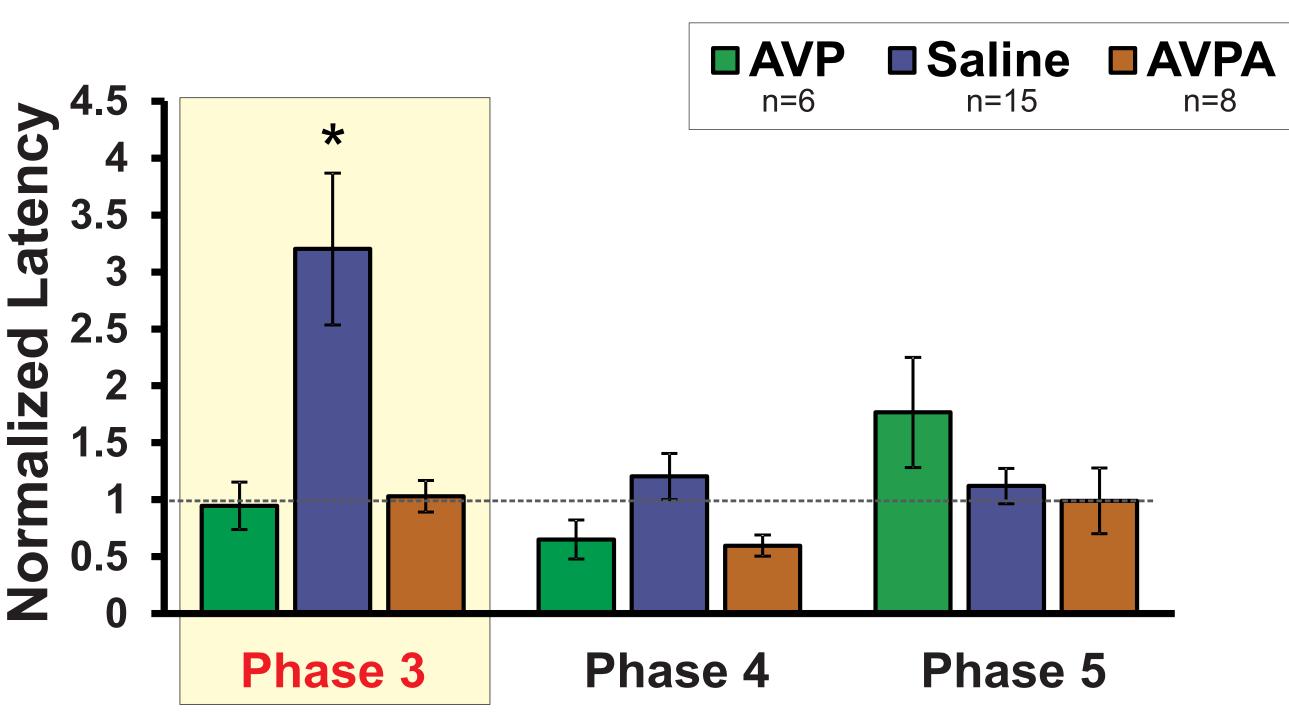
1. Department of Psychology, University of Arizona 2. Brain and Cognitive Sciences, Massachusetts Institute of Technology, MA 3. Biomedical Engineering and Applied Mathematics, University of Arizona

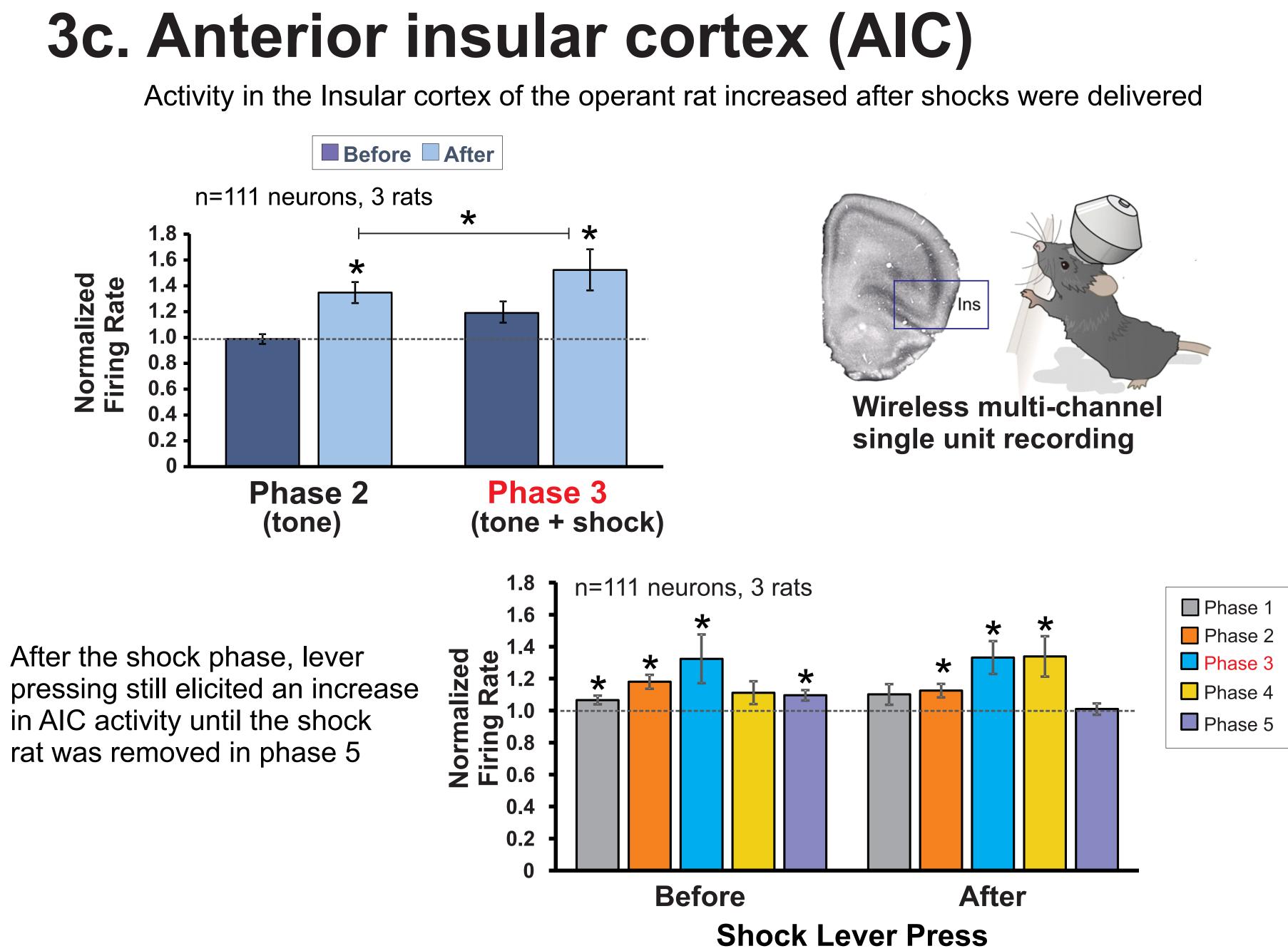


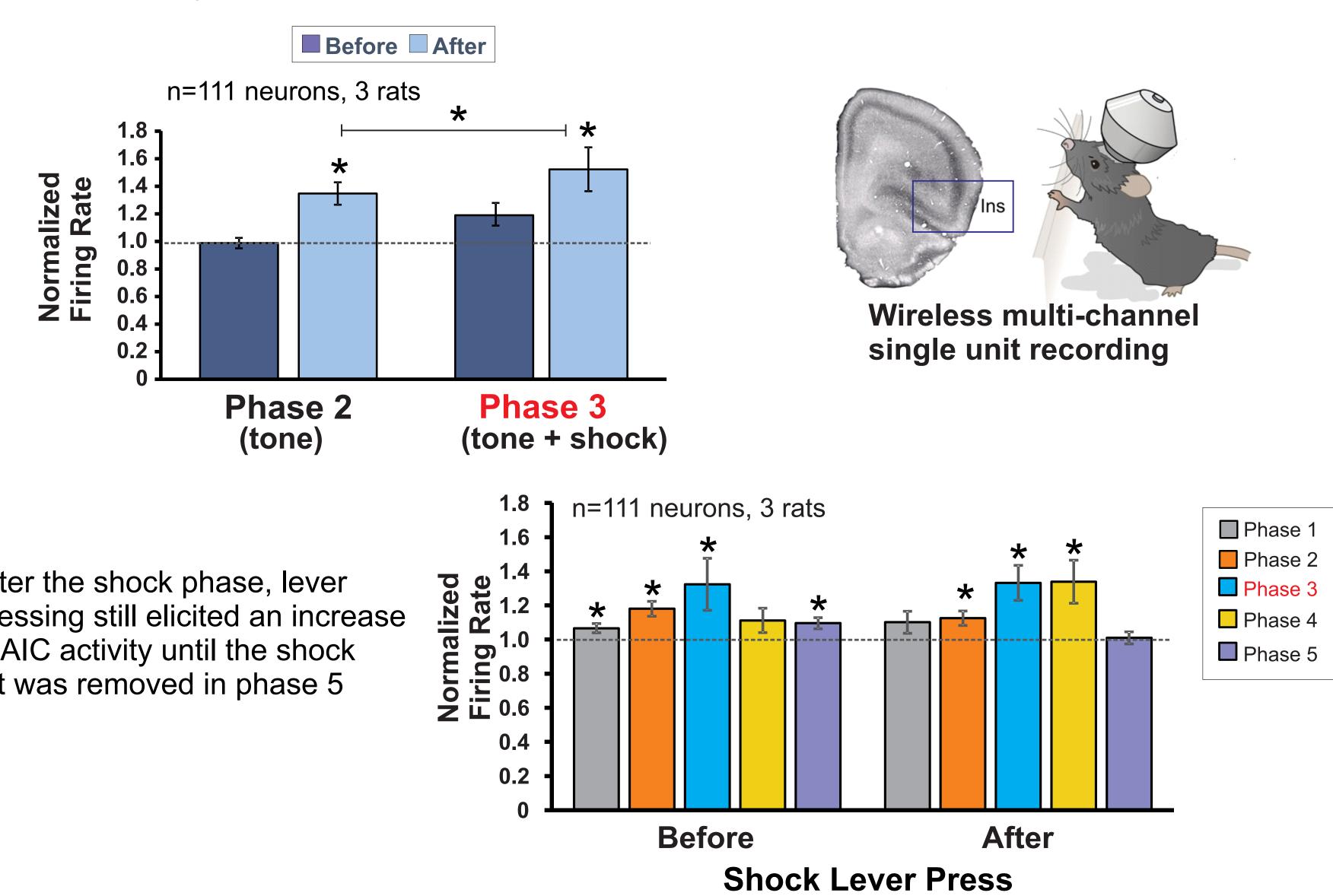
3b. Manipulations of the vasopressin system



Empathy behaviors were modulated by vasopressin







4. Conclusions

5. Future directions

- amygdala)



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 The amount of USVs in early phases (before shock phase) is related to the social context.

• Vasopresin modulates empathy behaviors in rats.

• Anterior insula may be involved in rat empathy.

• Explore possibility of more subtle effects of USVs in the empathy task (e.g. onset of behaviors, non-operant behaviors).

• Search for key brain areas on which vasopressin acts (e.g. insular cortex,

 Investigate whether insular cortex activity correlates with USVs or other behavioral responses exhibited during the empathy task.

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5. Contreras M., Medina C., Cruz K., Fellous JM (2015). A new rodent model to study empathy. 45th annual meeting of the Society for Neuroscience,

7. Acknowledgments

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