

# PRO-SOCIAL BEHAVIOR IN RATS: ELICITING EMPATHY TOWARDS AN ARTIFICIAL LIFE-FORM (IRAT)



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# PREVIOUS WORK: EMPATHY AND PRO-SOCIAL BEHAVIOR IN RATS

- ▶ Whereas human pro-social behavior is often driven by empathic concern for another, it is unclear whether nonprimate mammals experience a similar motivational state.
- ▶ To test for empathically motivated pro-social behavior in rodents, the authors placed a free rat in an arena with a cagemate trapped in a restrainer.
- ▶ After several sessions, the free rat learned to intentionally and quickly open the restrainer and free the cagemate.
- ▶ When liberating a cagemate was pitted against chocolate contained within a second restrainer, rats opened both restrainers and typically shared the chocolate.
- ▶ Thus, rats behave pro-socially in response to a conspecific's distress, providing strong evidence for biological roots of empathically motivated helping behavior.

Ben-Ami Bartal I, Decety J, Mason P. (2011) Empathy and pro-social behavior in rats. *Science*. Dec 9;334(6061):1427-30

# MOTIVATION: RAT SOCIAL INTERACTION STUDIES

- ▶ Determining whether or not another being is a socially relevant entity is necessary for proper social behavior and survival.
- ▶ In the wild, rats display a collaboration that incorporates cooperation and competition.
- ▶ We want to know how rats determine whether or not a being is worthy of membership in the social domain.
- ▶ As we further develop an understanding of the various behaviors that lead to social contact in rats, it would answer questions concerning social knowledge.
- ▶ Later in the future, we would like to take this study to the next level by examining whether rats will in fact treat something that is not a rat such an artificial life-form, as a relevant entity.

# ANIMALS: LONG-EVANS RATS

- ▶ We used 10 Long-Evans rats in our experiment because they are ideal for behavioral research. Rats were paired up and housed in five separate cages.



# IRAT



# CAGES



Paired rats in a cage for the experiment.



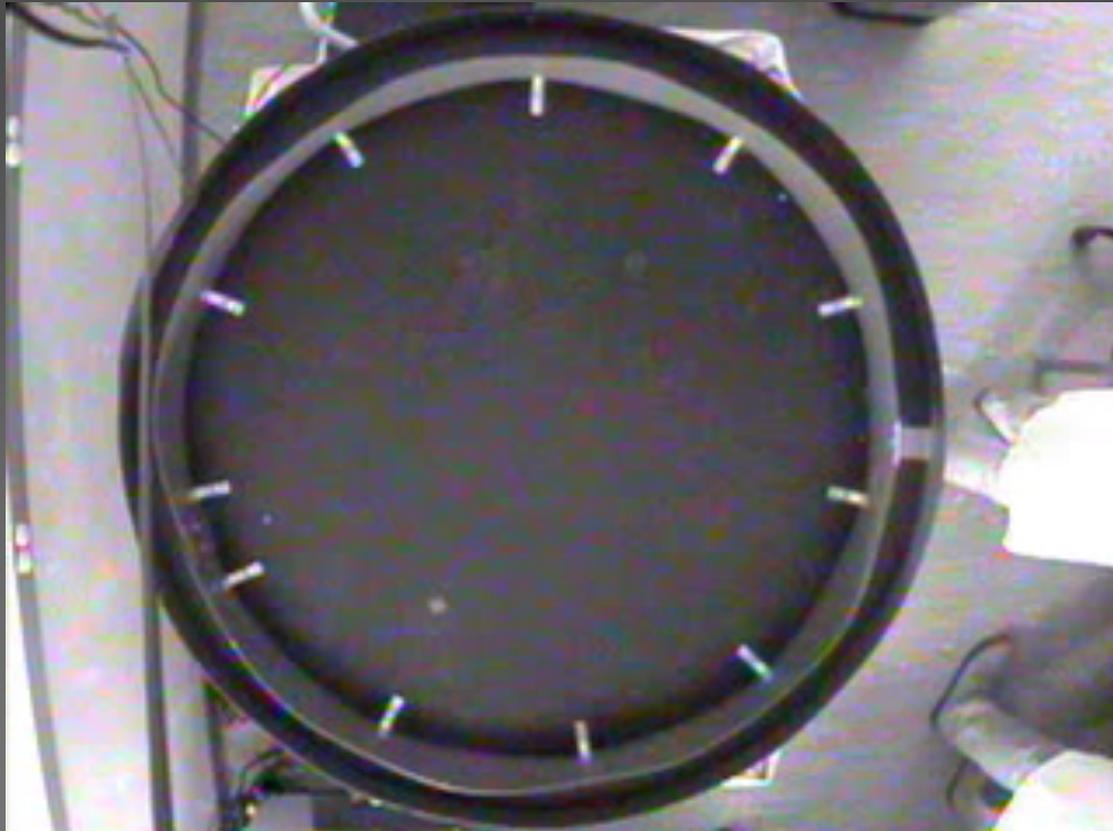
Cages in the Housing Racks.

# ENRICHED ENVIRONMENT



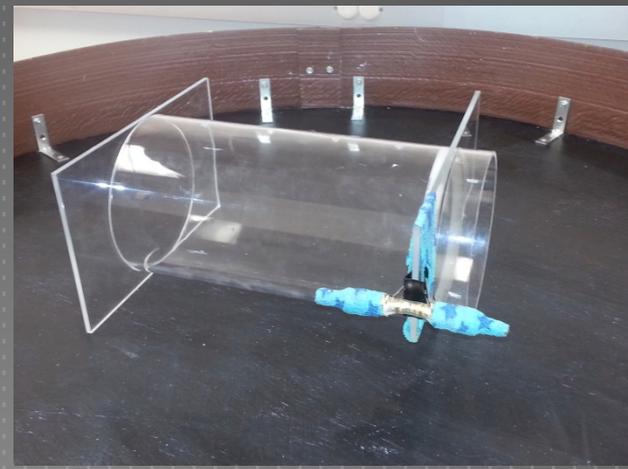
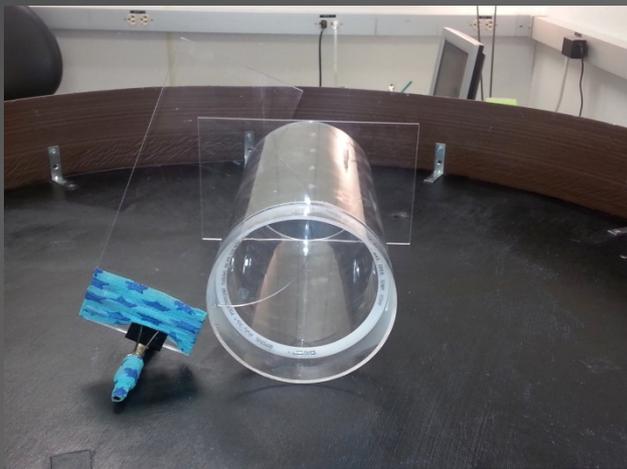
Each object is selected at random so that the rats could have novelty while in the environment.

# FOOTAGE OF RAT IN THE RESTRAINER



# APPARATUS: RODENT RESTRAINER

A Plexiglas rodent restrainer was used to cage one of the rats in the experiment. The restrainer is big enough for the rat to be comfortable while the experiment was occurring. The restrainer has one door that the free rat would open from the outside.



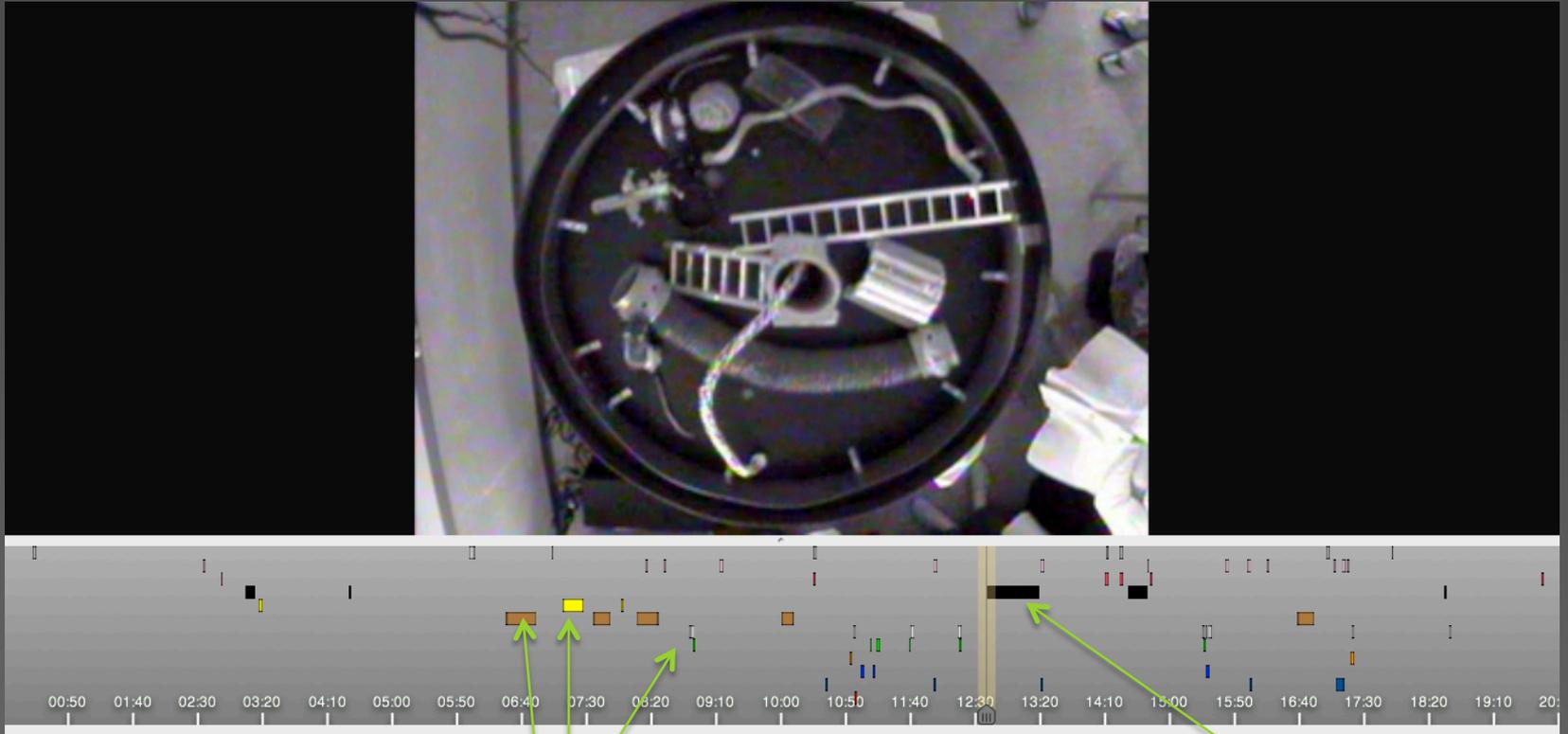
# ARENA: ENRICHED ENVIRONMENT

Enclosed Arena



External Track

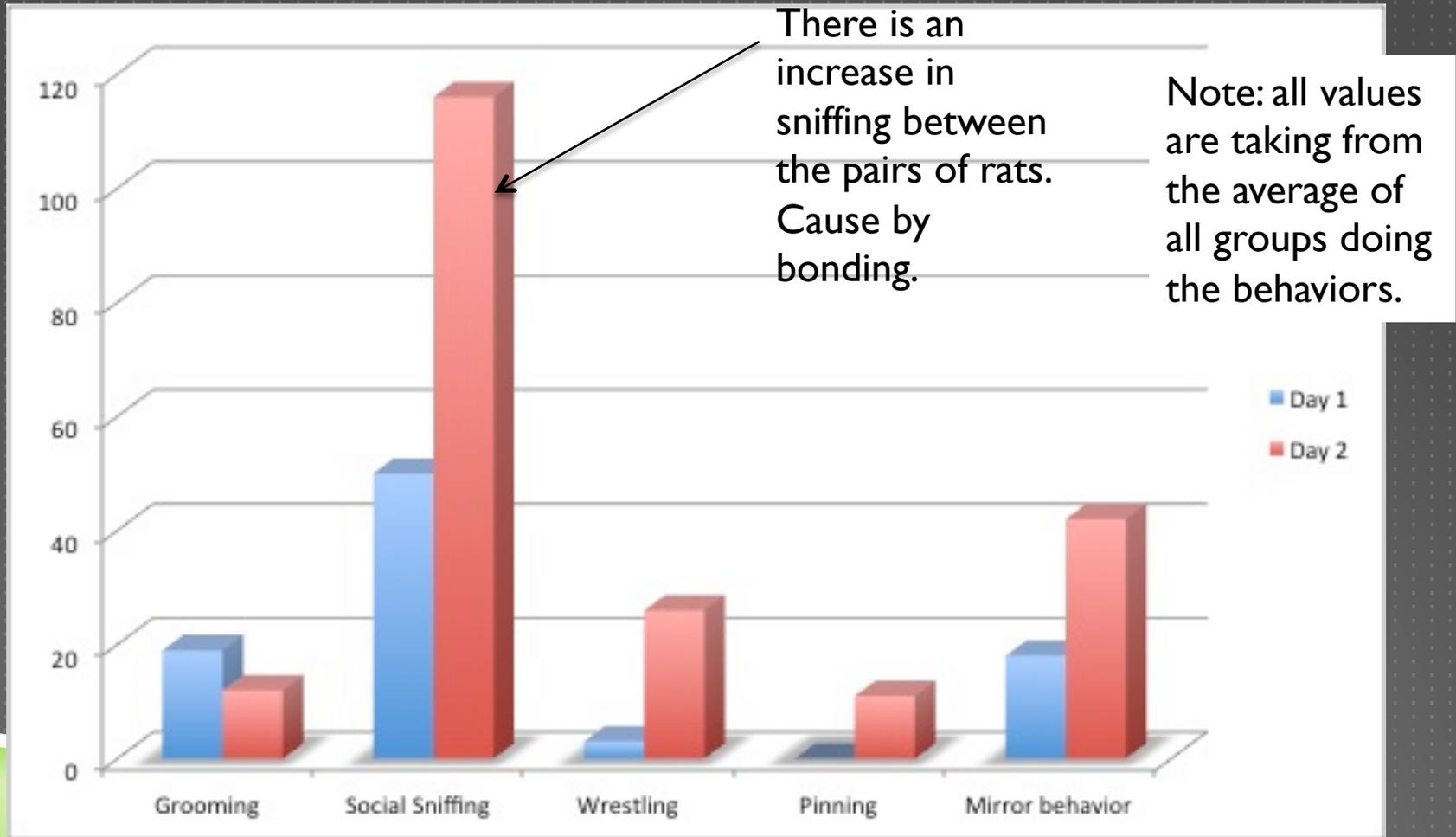
# CHRONOVIZ SNAPSHOT



Colors of the duration points correspond to a specific action.

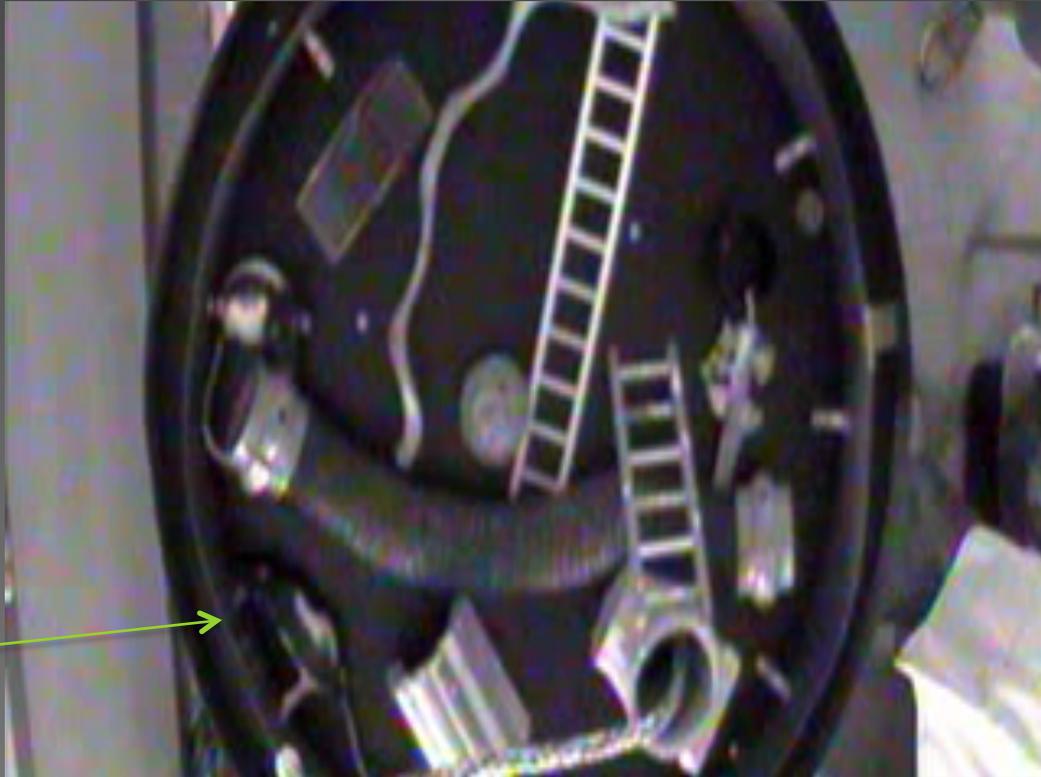
The duration point of each action.

# BEHAVIOR COMPARISON OVER 2 DAYS OF ENRICHED ENVIRONMENT STAGE



Overall, there is an influx of behaviors shown from day 1 to day 2 of the enriched environment stage.

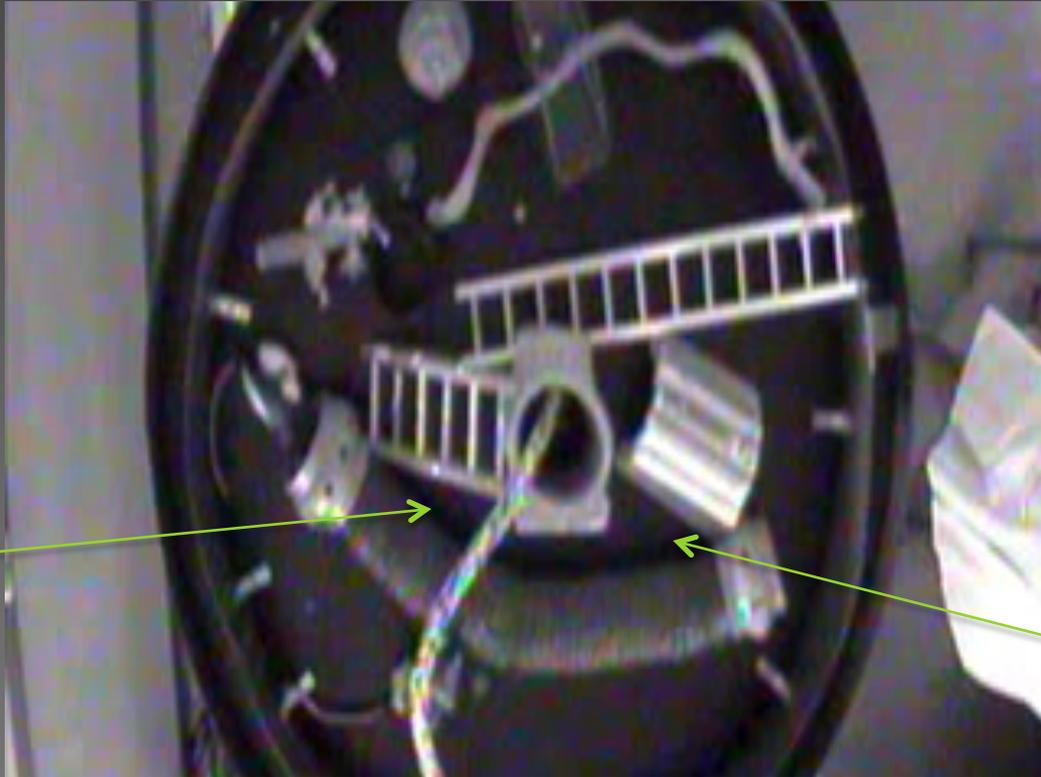
# WRESTLING ACTION



This is one type of wrestling that occurs during the study. It is tendency to play fight.

# PINNING ACTION

This is another form of wrestling that is observe in this experiment.



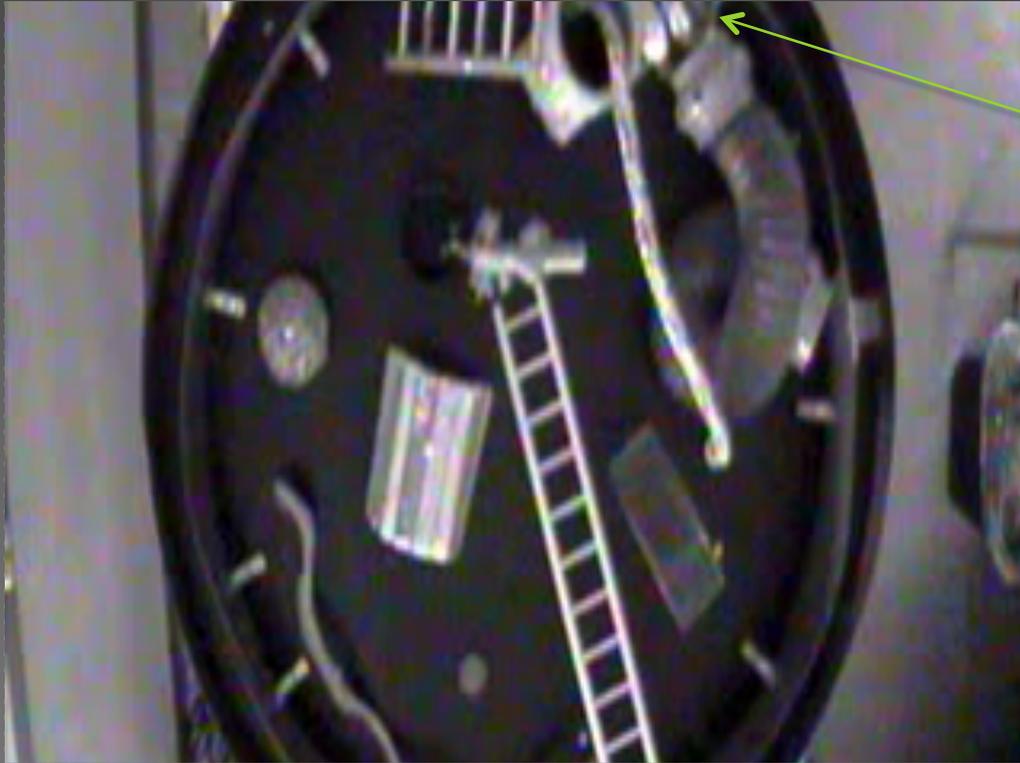
The actual pinning of one on its back in submission and the other directly over top of the other.

# MIRROR BEHAVIOR ACTION

Mirror behavior occurs when the one rat comes up and copies the action of the rat, which was there beforehand.



# SOCIAL SNIFFING ACTION



Social Sniffing:  
The rat that is  
on top sniffs  
the rat on the  
bottom.

# FUTURE ENDEAVORS

- ▶ We would like to implement the artificial life-form (iRAT) so that we can understand how they would treat a synthetic entity. Supporting Questions:
  - ▶ How must a synthetic rat behave in order to be considered “social”?
  - ▶ Must it act with “intention”?
  - ▶ Must it move in socially relevant ways, or emit sounds or smells?
- ▶ Our ultimate test will be to discover whether the real rat will act “altruistically” towards the synthetic rat.
- ▶ As we continue our research, we ultimately want to record from the brain to determine how the brain is encoding the empathic response.
- ▶ We would also like to know what the differences are between rats that are altruistic and that are not.

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