The Effect of Social Housing on Learning Ability in a Rodent Model

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To Learn is to Survive

All animals learn

The general-process theory of learning suggests that learning operates under universal laws

Decades of data support this idea

By studying how animal models learn and remember, we learn more about the human condition

To teach a dog a trick...

Animals must be motivated (humans too)

Most experiments designed to investigate learning require some sort of motivating factor

In most situations, this is food

However, a satiated animal no longer finds food rewarding

By restricting access to food and only providing it after successful completion of the task, researchers can get animals to do just about anything

Standard operating procedures

Rats are food restricted and kept at a body weight that is ~85% of their “free fed” weight

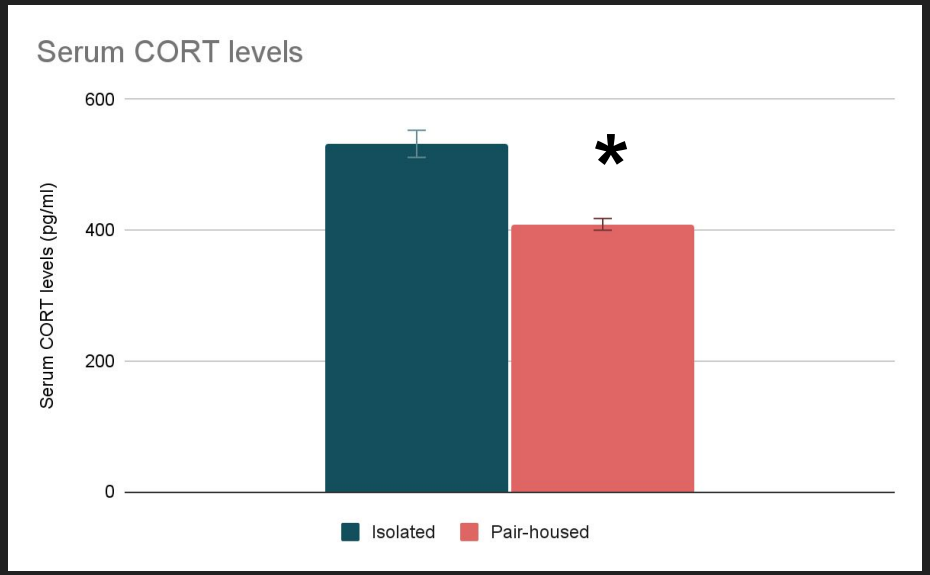
When food restricting, social housing is not an option

Rats are rewarded with food (chocolate chips, cereal, etc) for learning the task of interest

This is a problem

To be deprived of social contact is stressful (see pandemic)

Baseline CORT levels



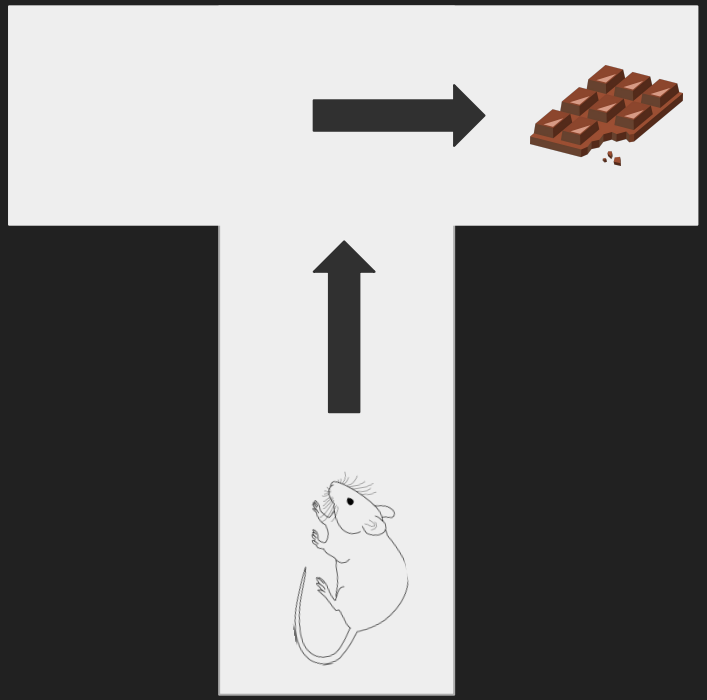
Blood was collected from the tail vein of the rat

ELISA used to assay CORT

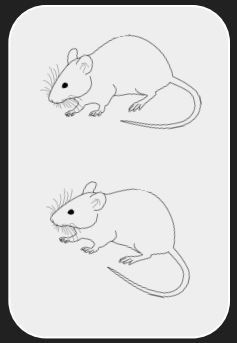
Isolated animals had significantly higher CORT levels than pair-housed animals

Can pair-housed rats learn like isolated rats?

What can you teach a rat?



50%



pair housed

unlimited food

50%

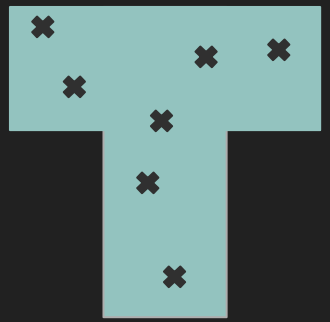
single housed

85% free feeding weight

How do you teach a rat?

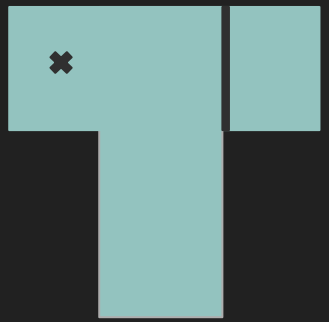
1

HABITUATION



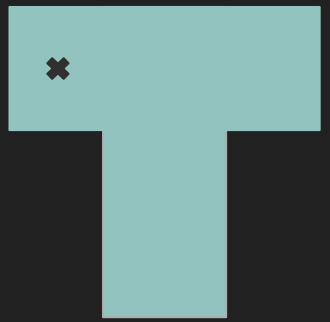
2

FORCED ALTERATION



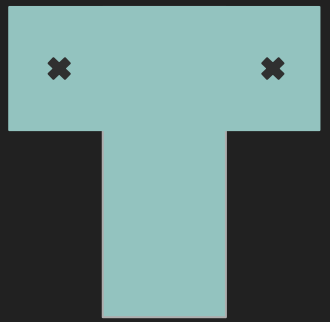
3

SPONTANEOUS ALTERATION

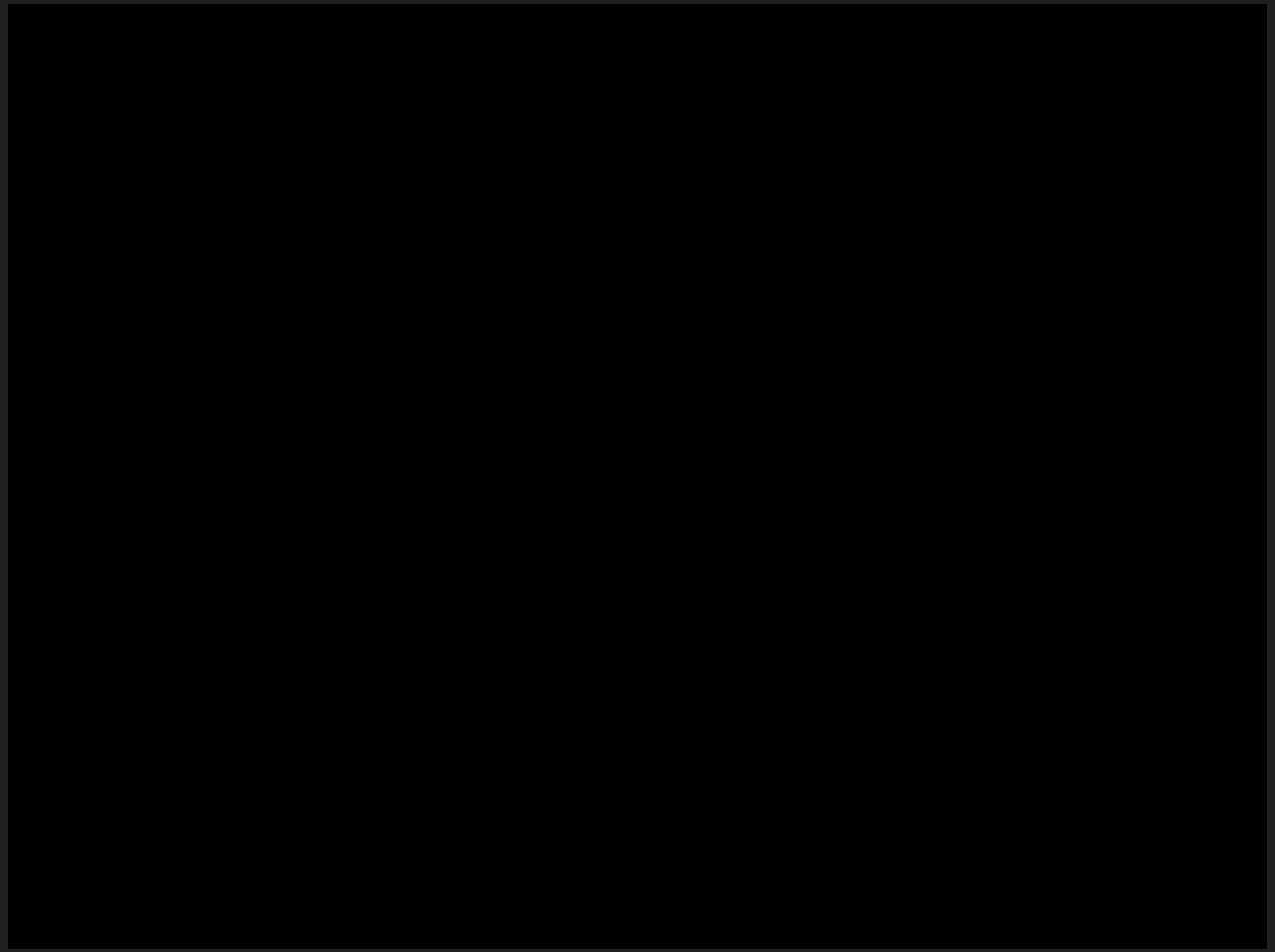


4

TESTING & MEMORY TEST

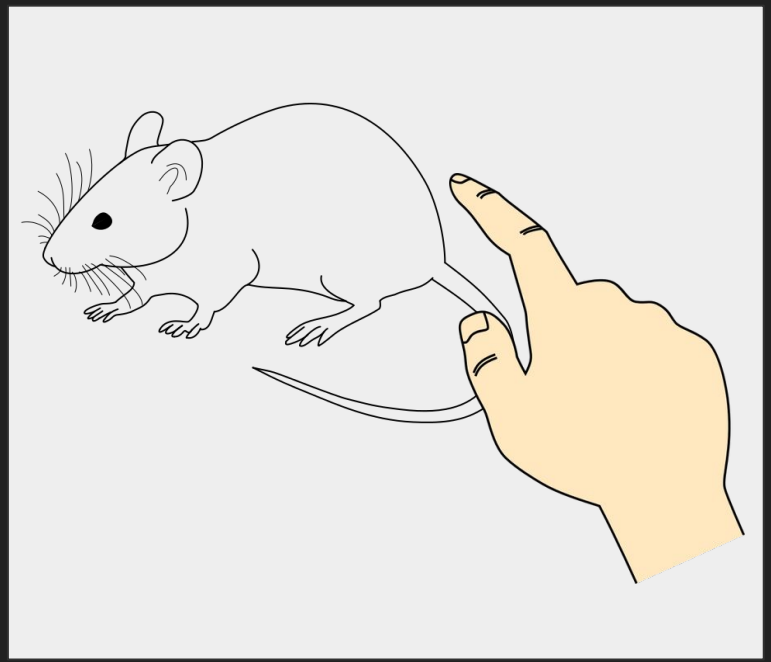


When things don’t go the way you want them to...



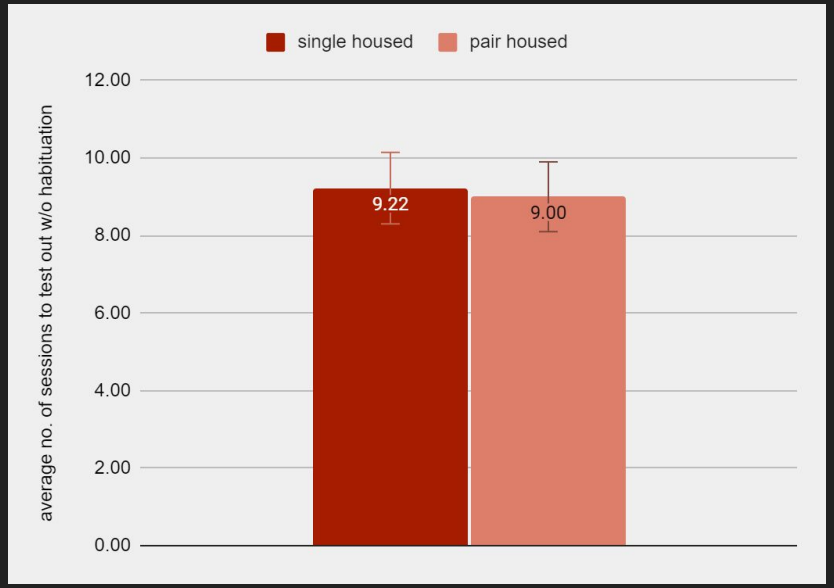
So I decided to poke them!

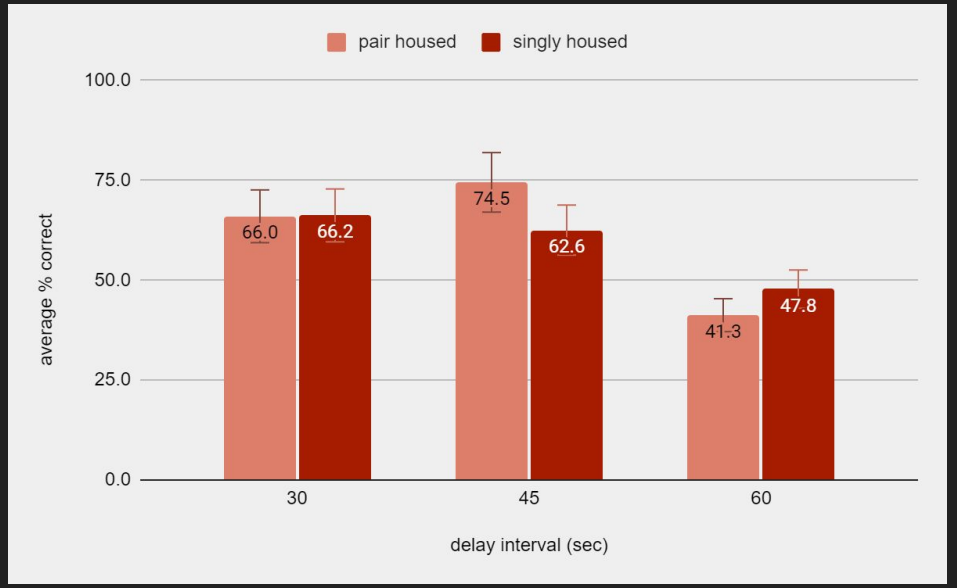
Learning is learning... even by different means



- Force of rotating my wrist onto the flesh part of their rear
- Forced Alteration
- Spontaneous Alteration
- Test
- Negative Reinforcement

Results





Slightly higher test scores, overall no difference

Takeaways....

Improvements:

- consistency
- habituation
- automation

Surprisingly little research on negative vs positive reinforcement

Next steps:

Just the beginning

Stress doesn't have to be a latent variable

Lawson, R., & Watson Jr, L. S. (1963). Learning in the rat (Rattus Norvegicus) under positive vs. negative reinforcement with incentive conditions controlled.

Open for Questions