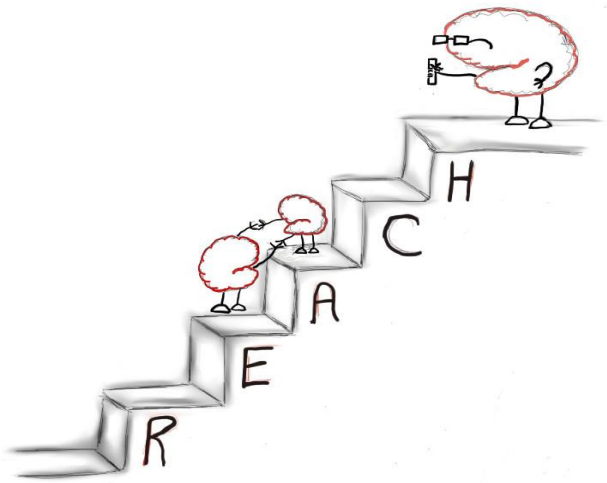
Exploring Learning Patterns in CFD Model Rats



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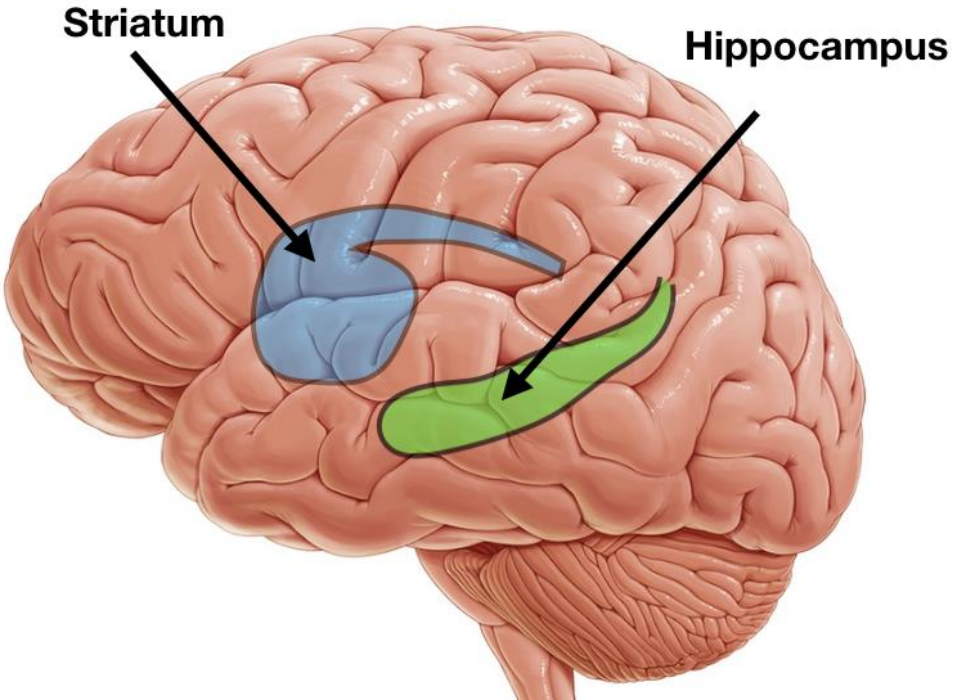
Learning

Learning is the change of behavior that is demonstrated as function of experience

- **Learning experiences differ in Autistic and Neurotypical Brains**
- **ASD people may experience learning difficulties because of the brain abnormalities**

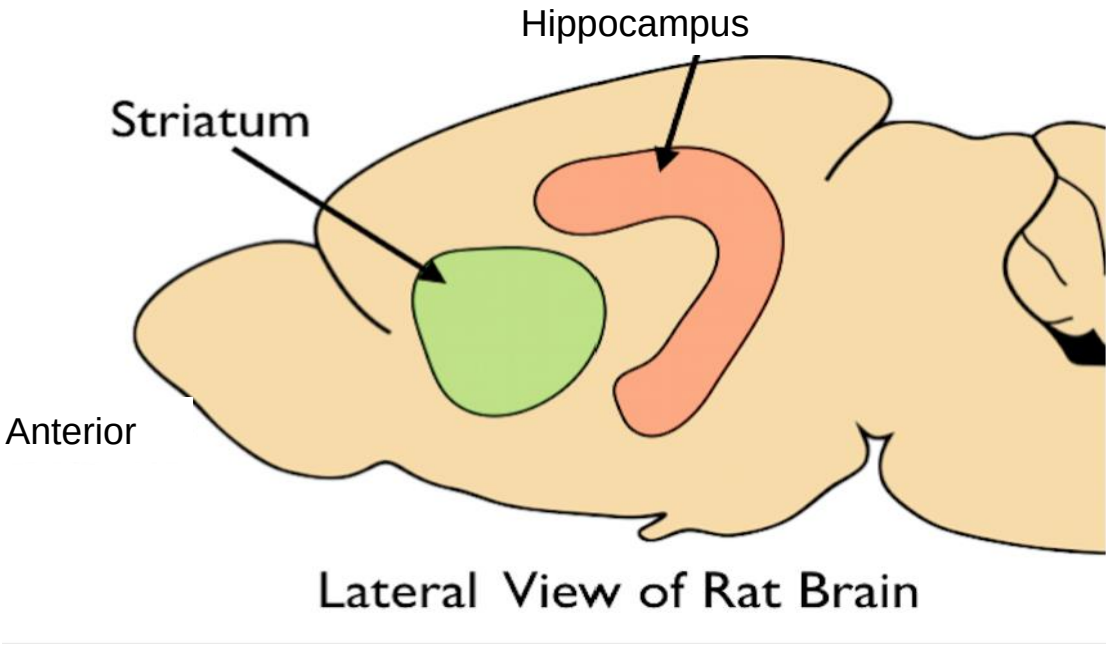
Learning requires a balanced use of each part of the Brain



Learning in the Rat Model

We want to investigate the section of the brain each strategy uses

- **Hippocampus — Critical for Flexible, Spatial learning**
- **Striatum — Critical for Habit-like, Response learning**



General Overview

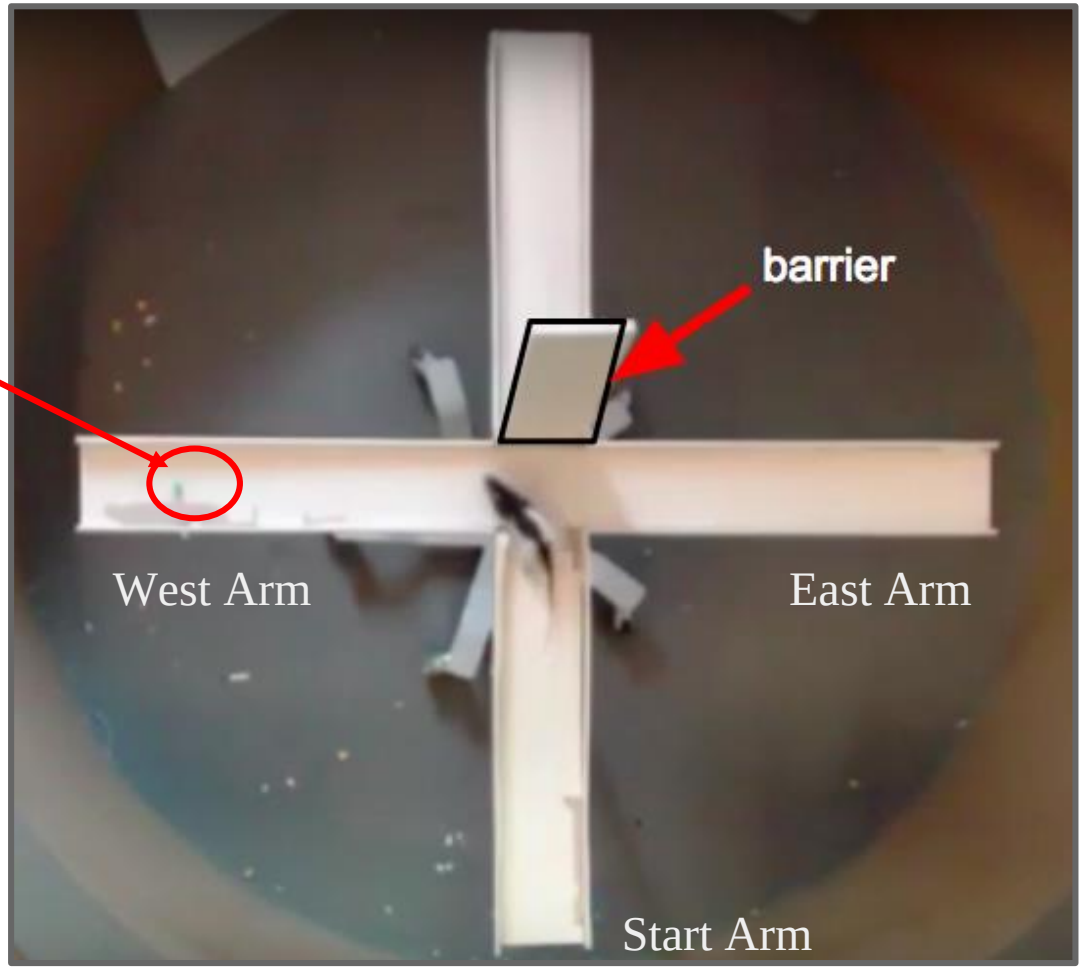
Hypothesis: We hypothesized there will be learning differences in CFD Model Rats compared to Neurotypical Rats

I. Are there differences in learning rates with CFD and Neurotypical Rats?

II. Do rats use spatial or response cues in learning?

III. Which group of rats is better at breaking their habit?

Methodology:



I. **Are there differences in learning rates with CFD and Neurotypical Rats?**

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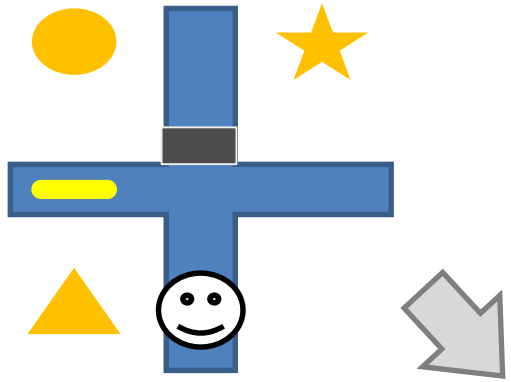
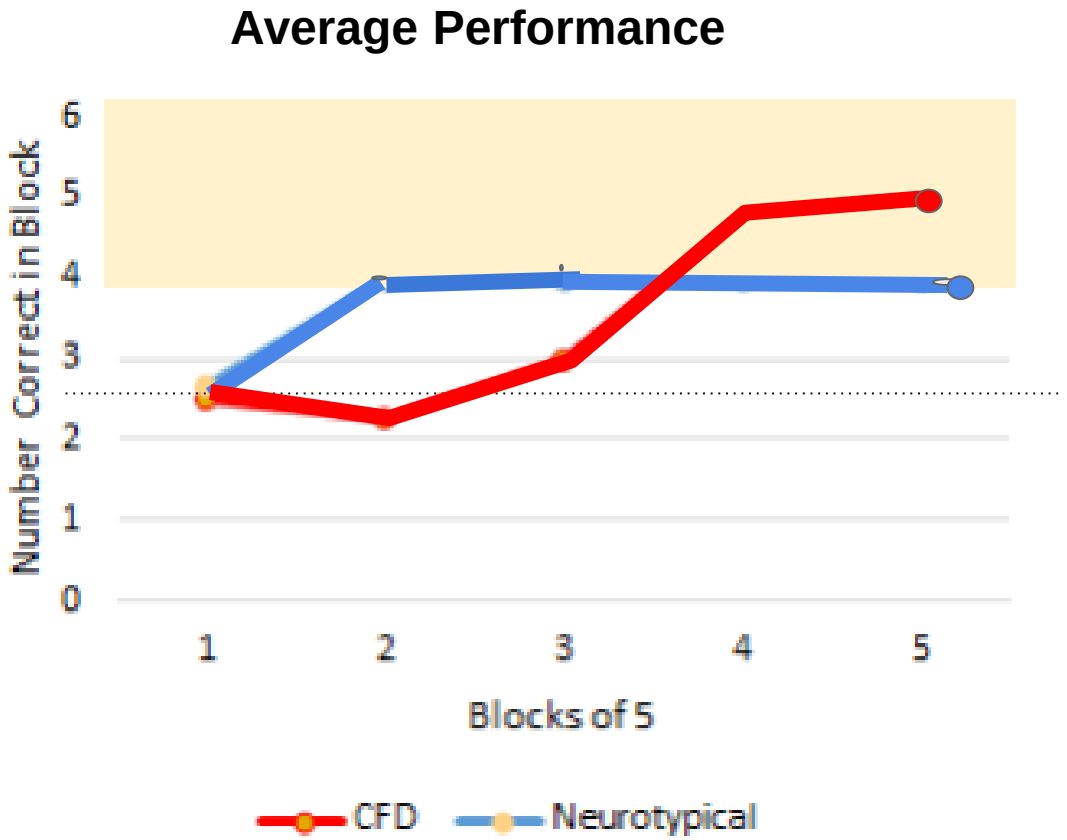
Study 1: Training Rats to Go One Direction



Each Rat was trained to go a specific direction repeatedly

Training to go Left

Both groups were able to learn the task



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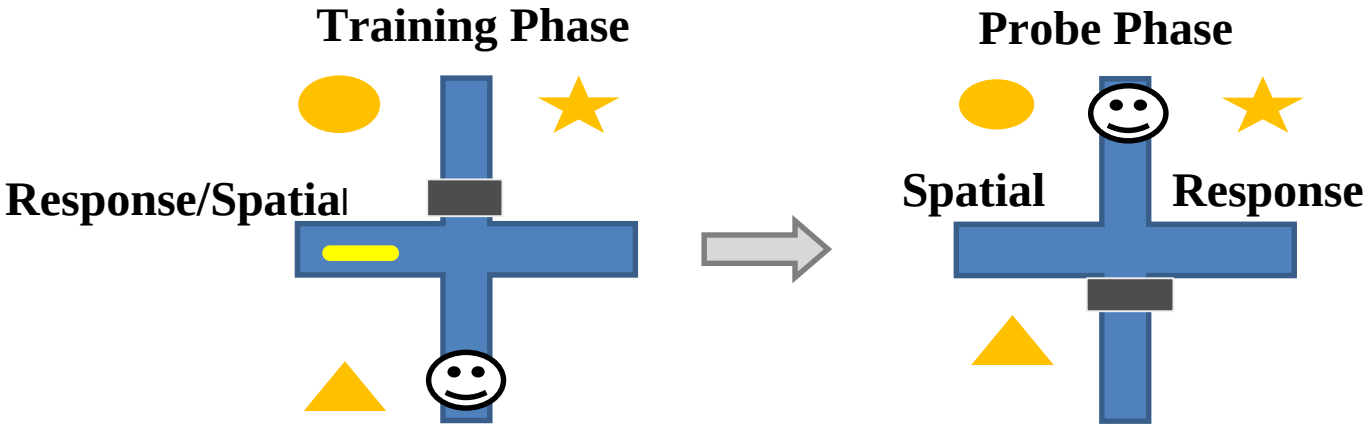
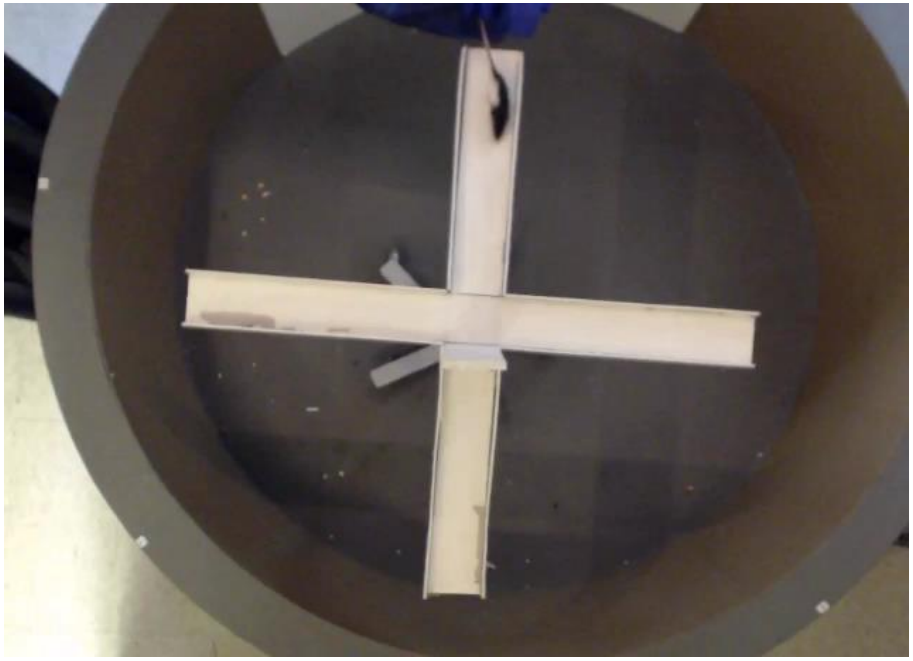
Study 2: Do rats use spatial or response cues in learning?





There's no difference in the type of strategy used for learning in the CFD and Neurotypical Rats

Rat Name	Probe Trial 1	Probe Trial 2
NTRat #1	Spatial	Spatial
NTRat #2	Spatial	Response
NTRat #3	Response	Spatial
NTRat #4	Spatial	Response

Rat Name	Probe Trial 1	Probe Trial 2
CFDRat #1	Response	Spatial
CFDRat #2	Spatial	Spatial
CFDRat #3	Response	Spatial
CFDRat #4	Spatial	Spatial

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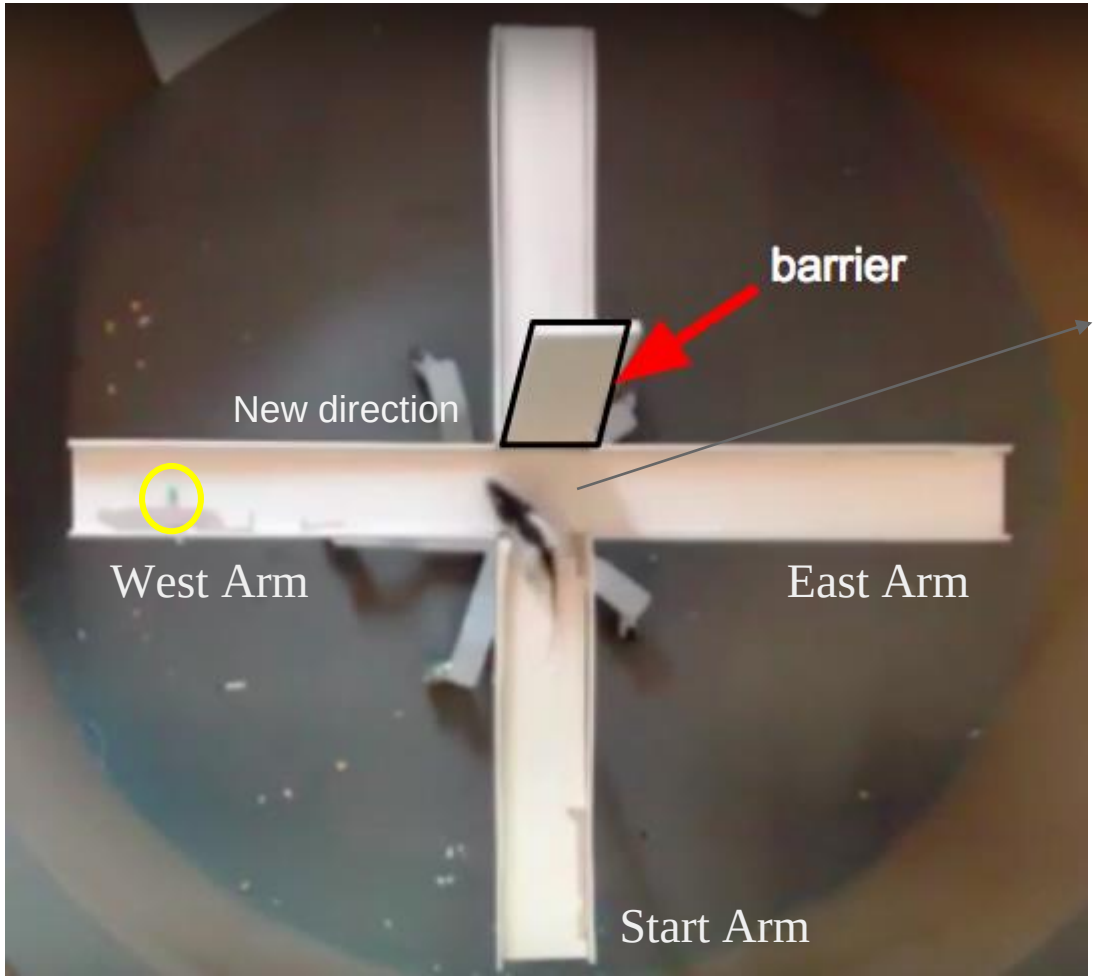
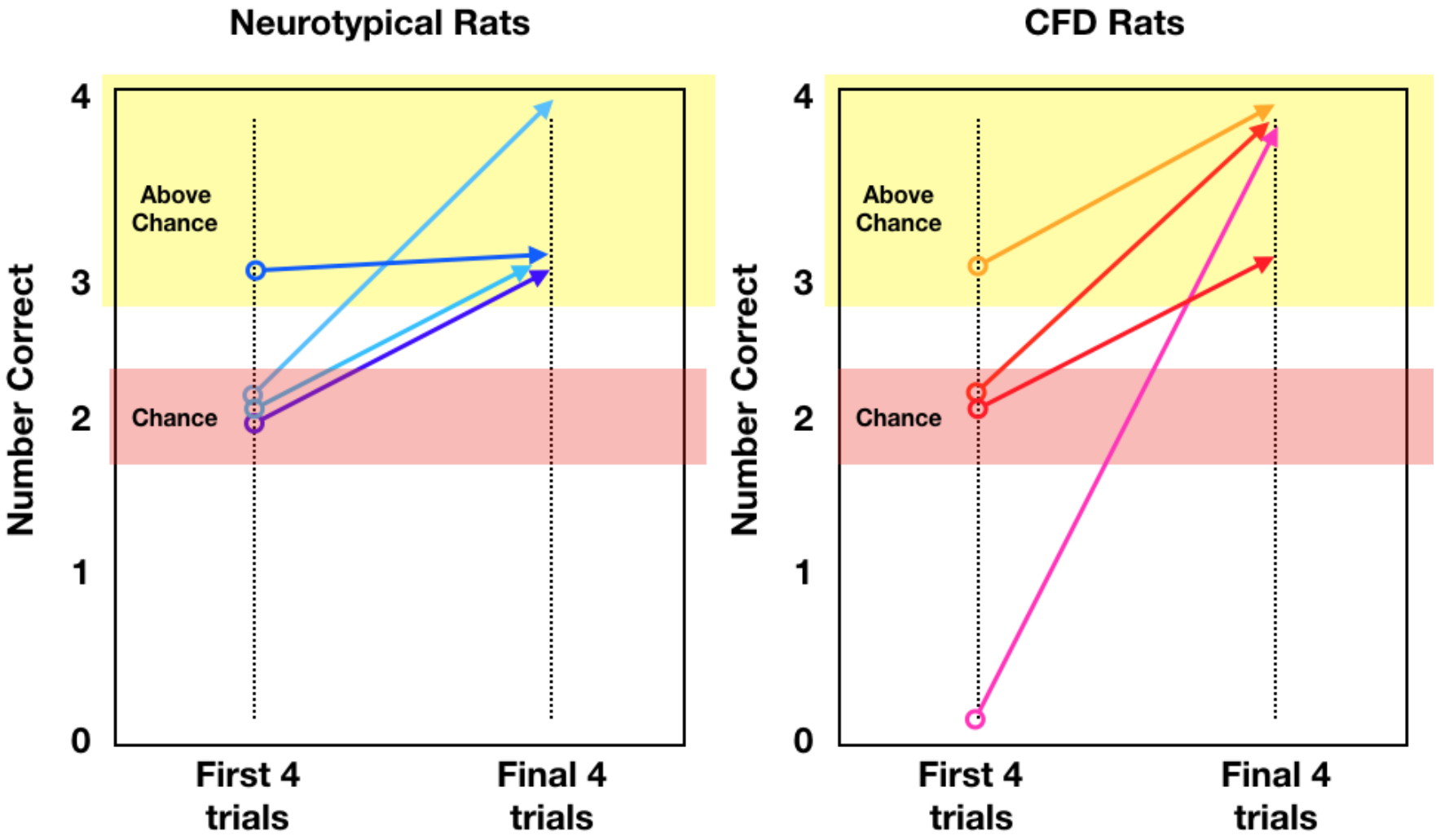
Study 3 (Reversal): Which Rats are better at breaking their habit?

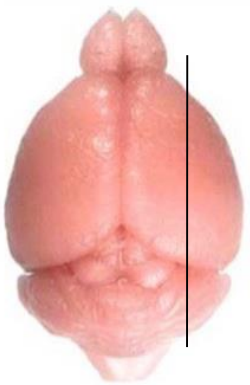


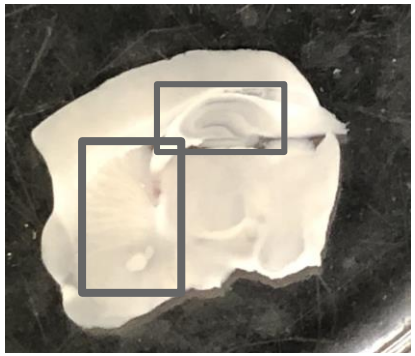
Study 3: Training each rat to turn to the opposite arm from its original training

Study 3: Both groups of rats demonstrated the ability to break their habits



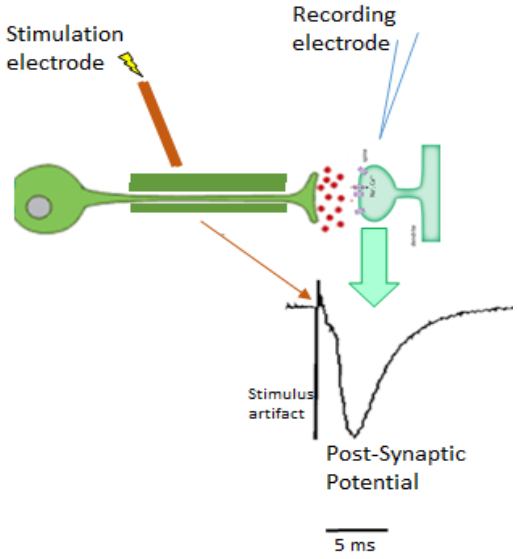
Functional Studies



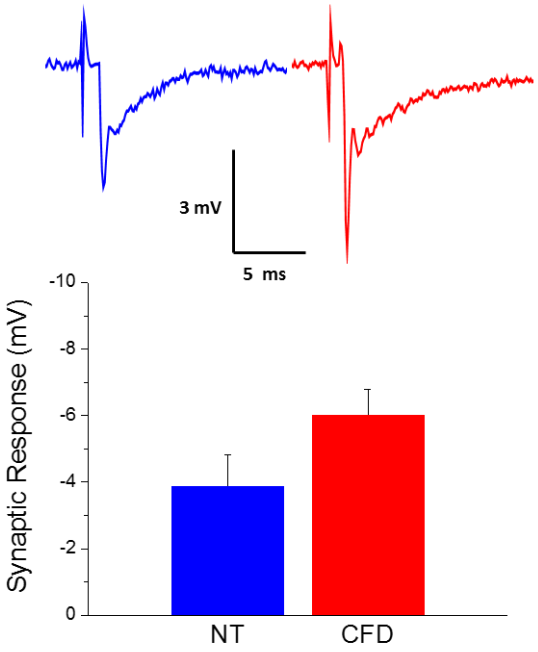


Striatum

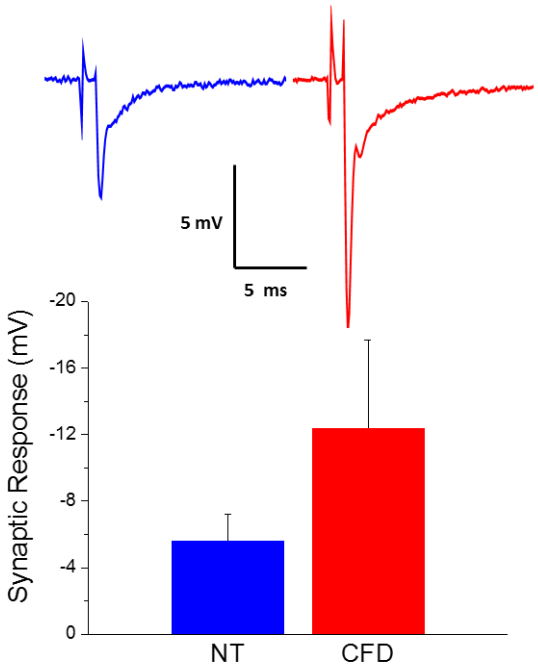
Hippocampus



Striatum



Hippocampus-DG



Conclusions

I. **Are there differences in learning rates with CFD and Neurotypical Rats?**

Both groups were able to learn rapidly. Group differences are likely due to small sample sizes

II. **Do rats use spatial or response cues in learning?**

Beyond our expectations both groups of rats used spatial and response strategies

III. Which group of rats is better at breaking their habit?

Both rats demonstrated the ability to break their habits

IV. Functional Studies - Electrophysiology

Both groups of rats show a enhanced synaptic communication in the hippocampus and the striatum

Shout outs

Dr. John Kubie

Dr.Jenny Libien

Dr. Juan M. Alarcon

Dr. Mary E. Valmont

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