Reward and punishment-related changes in behavior during a decision-making task in mice

REWARD-RELATED SOCIETY
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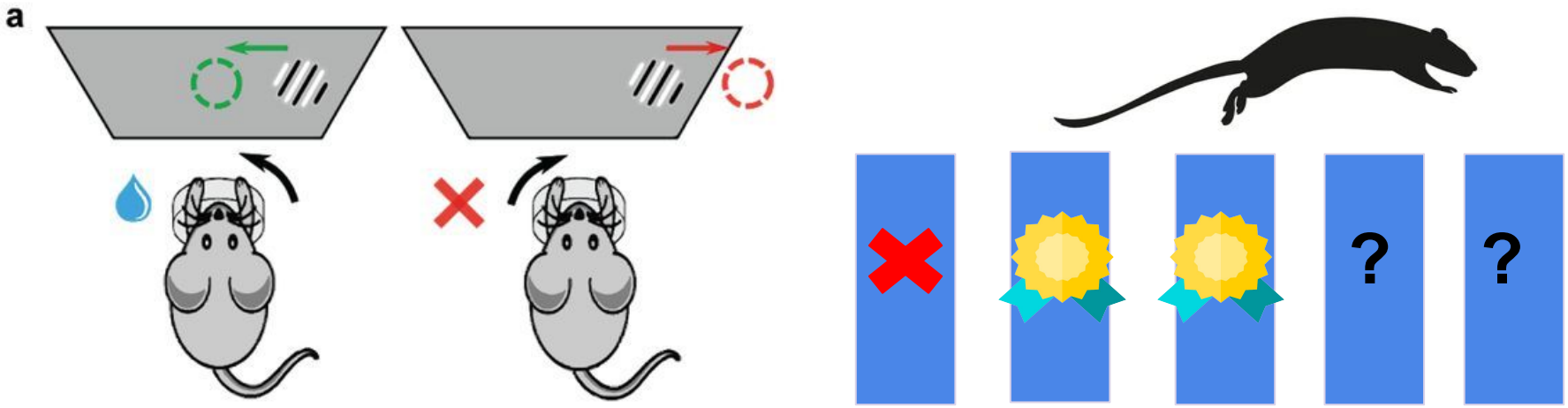
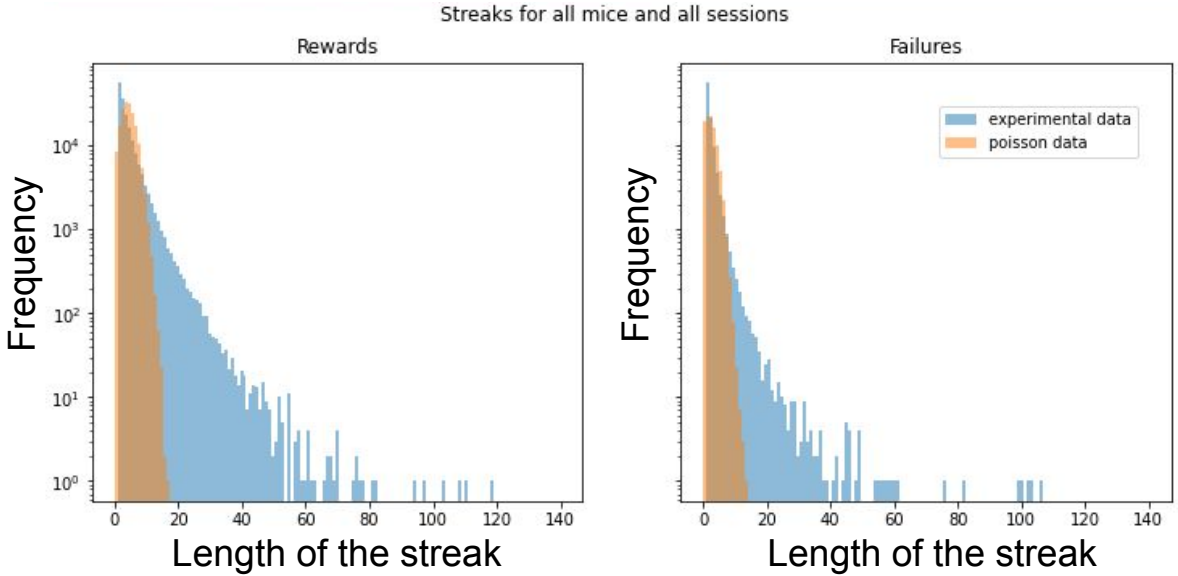
Do past rewards/failures affect decision making?



Do past streaks of rewards or failures affect subsequent choice of the mice in training?

Are streak lengths randomly distributed ?



Method: Plot the frequency distribution of streaks in data Vs. A Poisson distribution with the same mean.

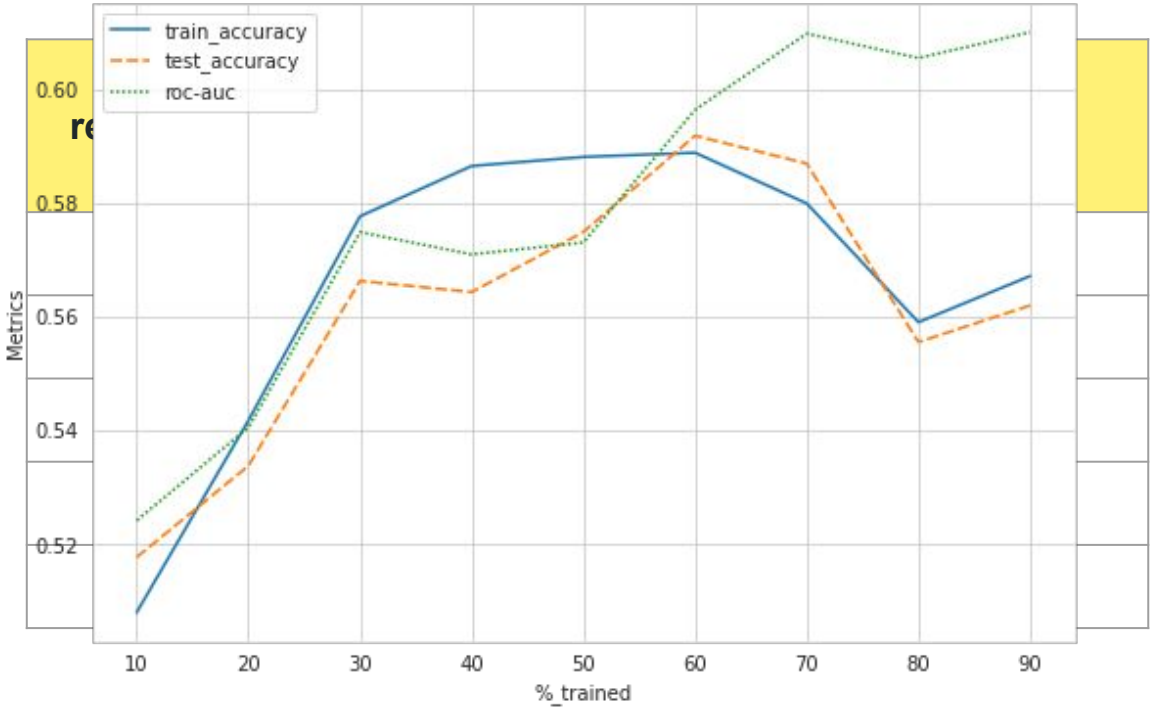
Finding: Streaks are NOT randomly distributed.

Discussion: It is an evidence of learning, and a reason to carry on with our question.

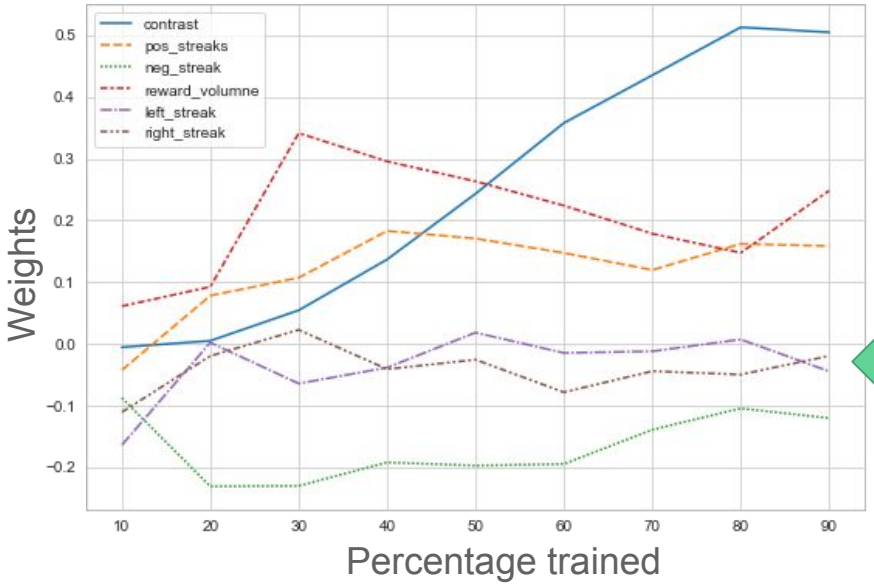
Can previous streaks predict the next choice?

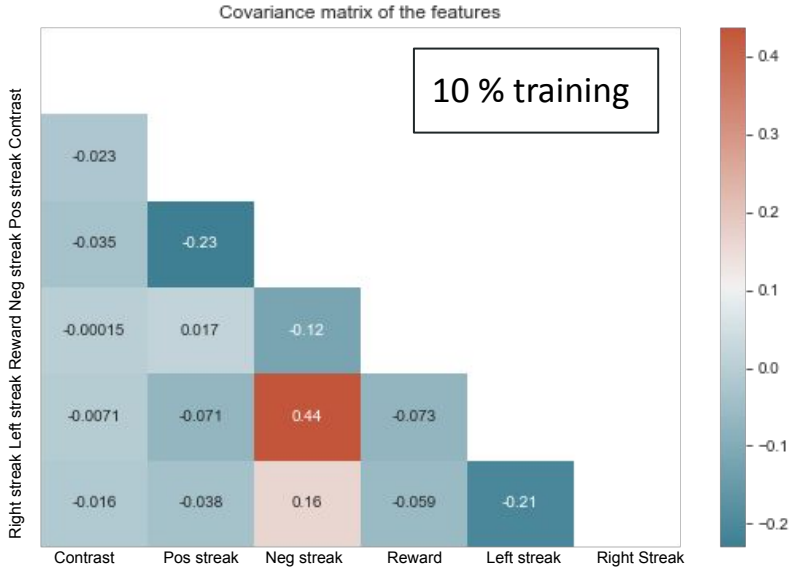
Logistic regression model to predict the current choice based on:

- Streaks of rewards
- Streaks of failures
- Stimulus contrast
- Past reward volume

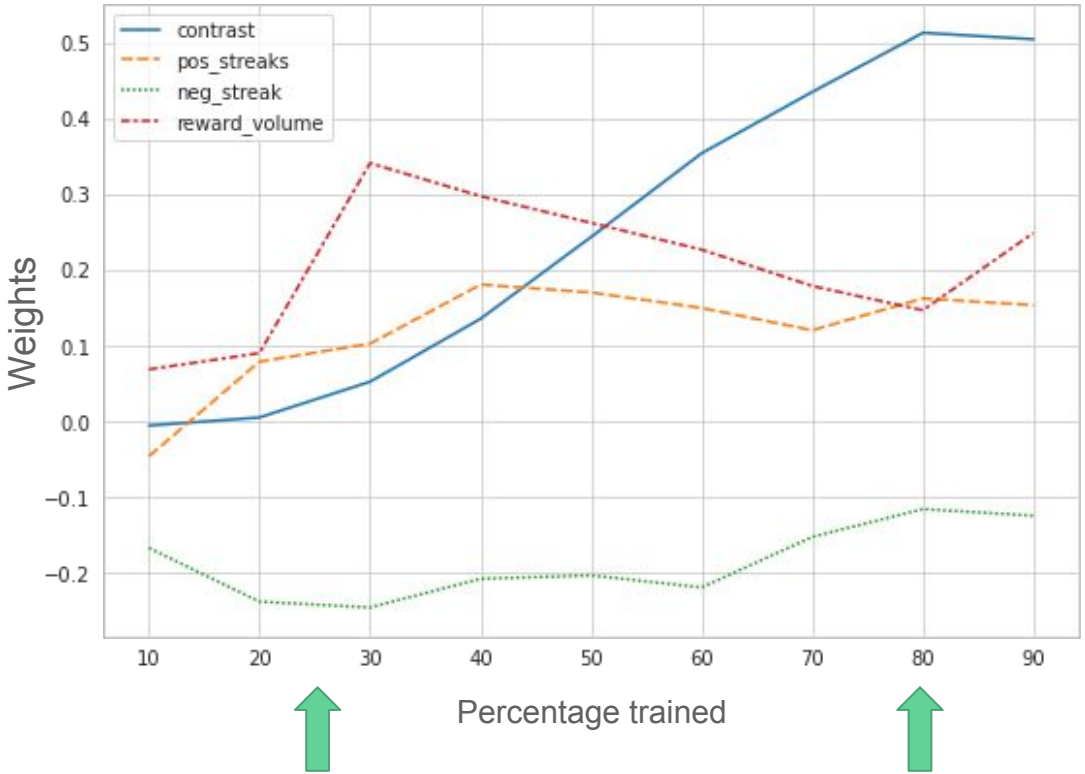


Past streak of location has no impact on the model





Take-home messages



- The model learns to classify the next trial response.
- Contrast becomes the most prominent factor in the end.
- Role of the water volume : Do we get used to or excited about rewards?

Further goals

- Is there an optimal streak of rewards?
- Why are left streaks and negative streaks correlated?
- Consider more features & labs!
- Are reward/failure streaks predictive of task engagement?

THANK YOU!

Specially thanks to :
Dr. Gal Haspel, Steeve Laquitaine and Azba Shaikh.

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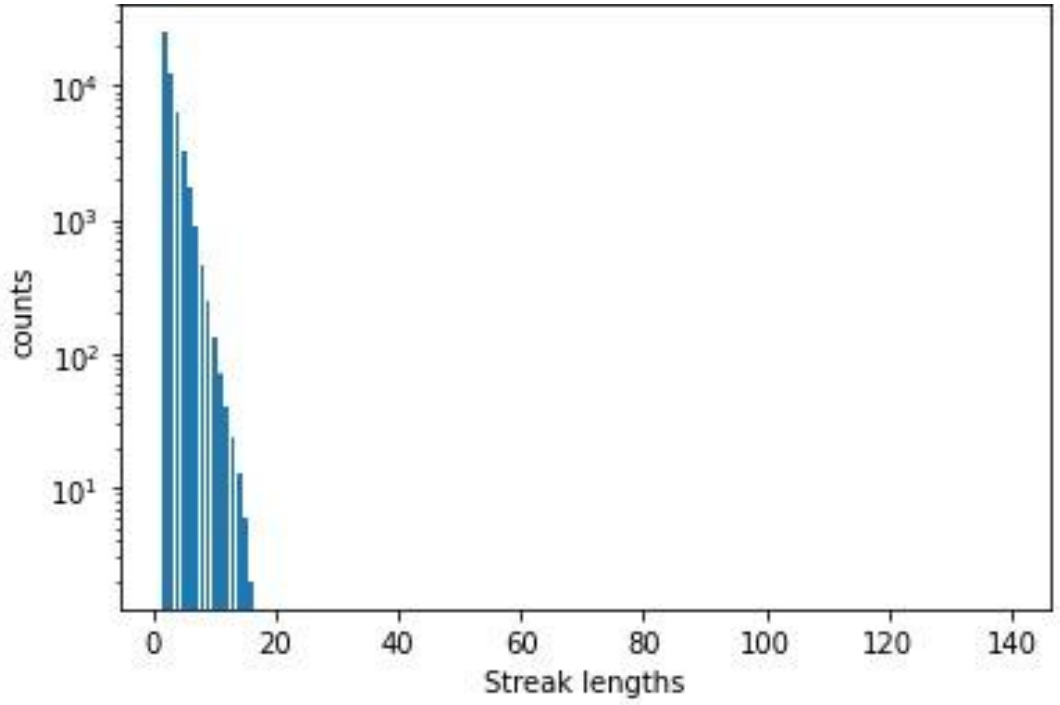
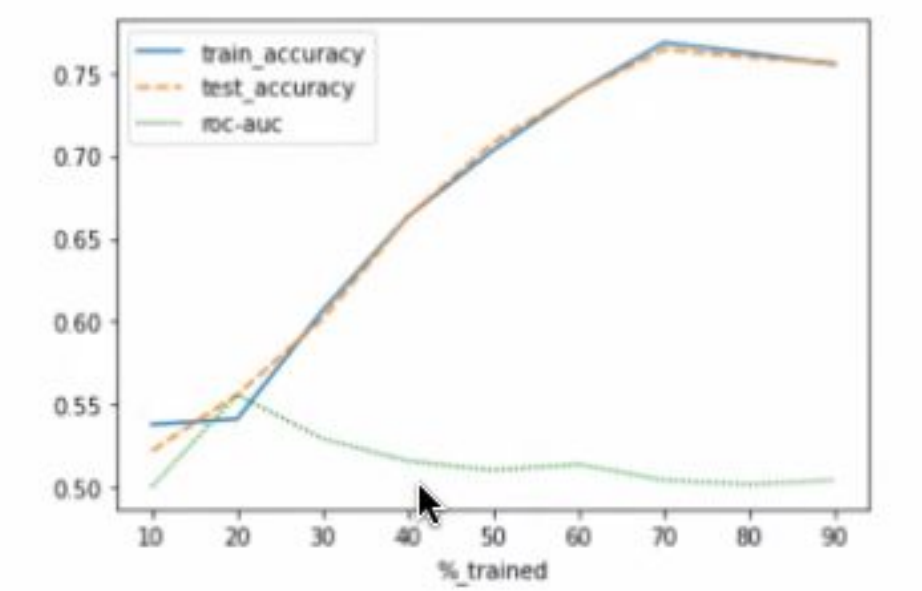
SUPPLEMENTARY – Streak length distribution in a truly random simulated dataset.



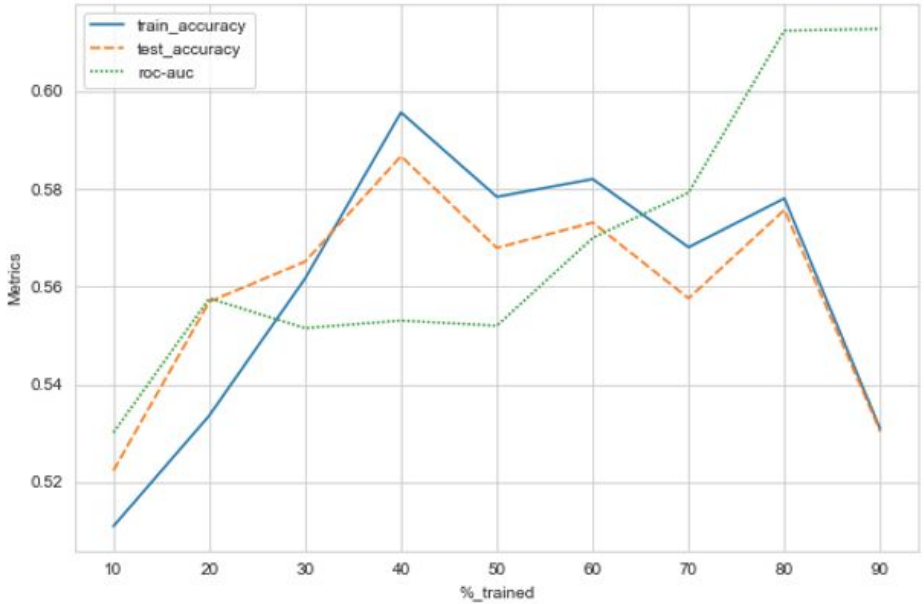
SUPPLEMENTARY – Initial unbalanced model



Can previous streaks predict the next choice?

Method: build a logistic regression model to predict the current choice based on previous streaks of rewards/failures with stimulus contrast and past reward volume as additional features.

Past cumulativ reward volume (
5
7
…
22
25



urrent choice
1
1
…
0
0

SUPPLEMENTARY – One hot encoding