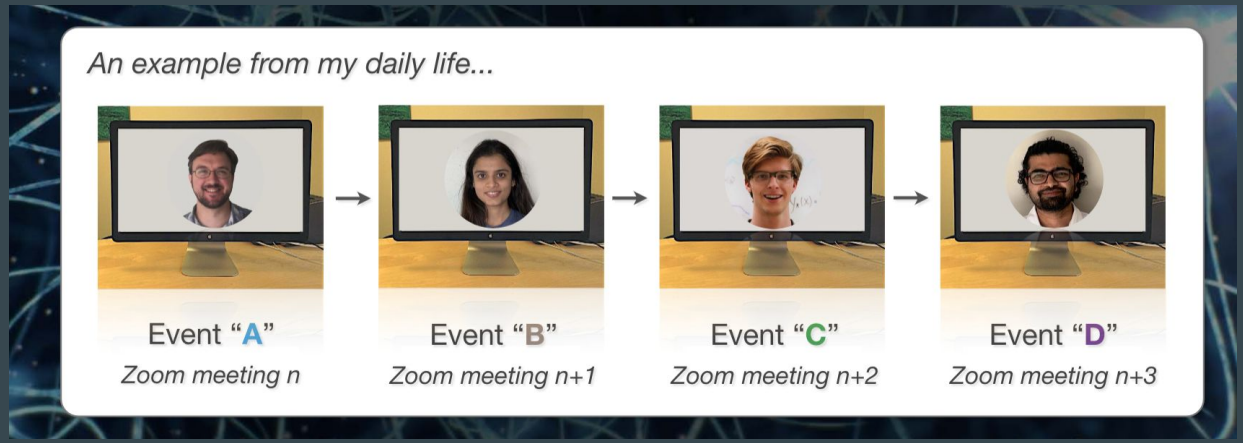
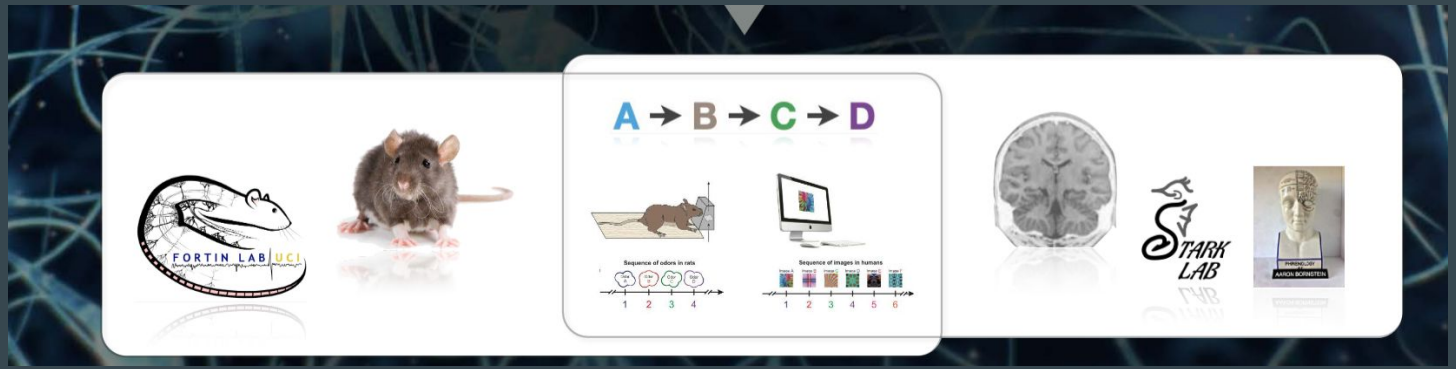
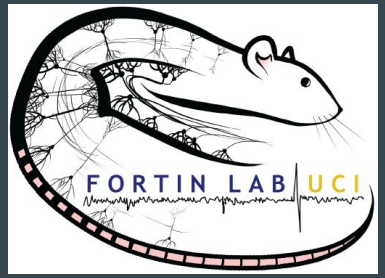
How Does the Brain Support Our Ability to Spatially and Temporally Organize Memories?







Neuroscience Research

•••

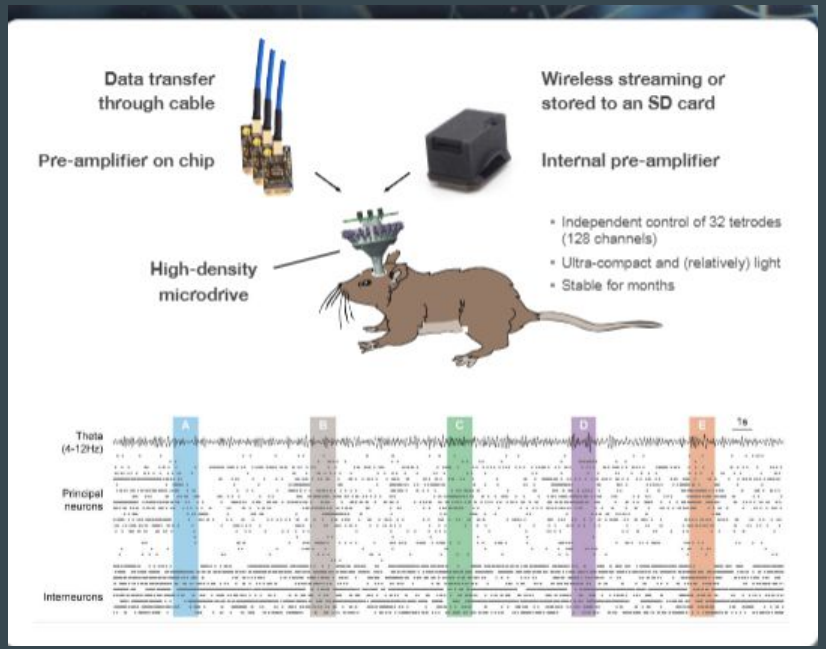
Team 5 - Fortin Labs

Presented by: Giles Carlos, Mia Chiu, Alyssandrei Parinas, Cadence Pinkerton, James Owens

Methods

EXPERIMENTAL

1. Testing the memory for sequences of activity in rodents
2. Record the activity from collections of neurons
3. The experimental approach to acquire information from the rats begins with using electrodes inside a high density micro drive.



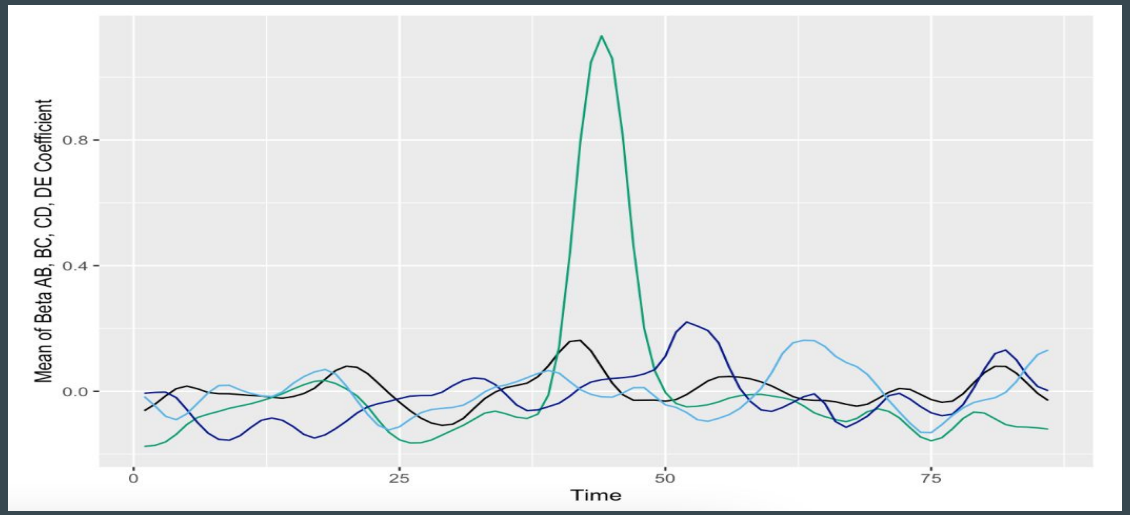
Methods- continued

4. Once the electrodes are in the high density microdrive, the microdive will go on skull of the rat and the electrodes will be inserted into the the brain
5. With the electrodes inside the rats skull, we are able to record the neural activity of what's happening in their brain (specifically we are focusing on the hippocampus and prefrontal cortex.
6. After this you put the electrode interference board on top of the high density micro drive, and then the data will be transferred through cables (which is showed in the picture above).
7. The data we extract from the process will give us sequences and the temporal coding to illustrate the spikes in the data.

Analysis to Implement

Characterize the distribution of peaks in the sequenceness metric (regression coeff., or Betas) and in the odor decoding (odor probabilities) during each type of inter-stimulus interval (ITI)

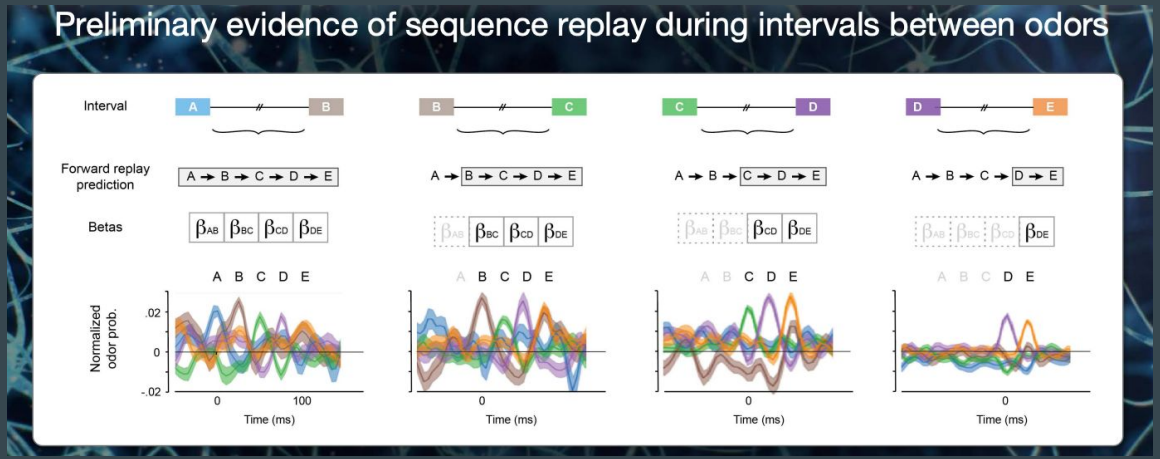
Hypothesis: There will be 5 peaks during the replay events during ITIs A-B, 4 peaks during the replay events during ITIs B-C, and so on. Similarly, we can also quantify the total number of peaks in the regression coefficients that occur during the replay events.



Our Goal

Do hippocampal neurons also “replay” those sequential relationships between odors (quiet periods when you can think)?

- Two Types of Sequential Replay: **Forward** and Reverse.
- Prior research has suggested forward and reverse replay
  - Replay for non spatial information has yet to be directly demonstrated at the neuronal level.
- In other words, can we catch the rats “replaying” the relationships between events?



Thank you!