**GOALS:**

1. **Understand the Dream structure**
2. **Understand Cosine Tuning**
3. **Understand exploratory data analysis**
4. **Understand GLMS**
5. **Understand neural decoding**
6. Go to the Dream directory
7. Redownload the Stevenson dataset.
8. LoadDreamPaths
9. Go to the experiments directory
10. d=load(‘Stevenson\_2011\_e1.mat’)
11. Have a look at the data, in particular the subject structure. What would you expect to be there. What do you find where?
12. Use Animate. what is going on in this experiment?
13. Use HandPlot. What can you say about the data?
14. Now. Lets look at the Subject.Trial structure. What is there? Plot it!
15. For 10 randomly chosen neurons, plot its spike as a function of x and y coordinate of movement. For one trial. For all trials
16. Do the same as a function of x and y velocity.
17. What does this imply about the tuning properties of the cell?
18. Fit a linear model in x and y velocity (cosine tuning model) to the spikes, after smoothing spiketrains with a 100ms smoothing kernel.
19. Why is the model called a cosine tuning model?
20. For which temporal delay delta t between neural firing and movement do you get the best fits?
21. Real spike counts can only be positive. Hence the linear model does not seem to be quite appropriate for this problem. Instead fit a binomial model using the matlab glmfit function.
22. ADVANCED: Quantify the predictions of the glmfit function
23. ADVANCED: Use the glmfit function to model the data using both interactions between neurons and their relation to the stimuli (the neurons were all recorded simultaneously)
24. ADVANCED: Decode acceleration, velocity, position using the neural data.
25. VERY ADVANCED: combine the two previous approaches. Do you do better than using just one?
26. If you get through 1:21 during the tutorial time… PLEASE apply to my lab