**Week 1:**

* Where are you doing your internship?
* What hours do you work?
* What are your responsibilities?
* Did the on-site supervisor assign any reading?
  + If yes, explain
* Have you started reading either of the books I assigned you?
  + If yes: How far have you gotten?
  + Have you started making any connections between your reading and your “Real World” experiences?
    - **\*\*Note:\*\* you will address this in ALL of your reflection papers.** To earn full credit for your reflection papers, you will need to write about making make connections between your reading and AT LEAST one of the following: something you are doing or have done as part of your internship (preferred option), something that might come up in the future either in the internship or in your career, other courses you have taken at Centre or your own personal life.
    - “Good” reflection papers are typically 1-2 pages. A paragraph won’t cut it.
* I am participating in two projects in the internship. The first one is a terrain category learning task. We are at the preliminary stage of testing the program for just-noticeable differences. I am helping with developing the scoring code so as to keep the code up to date with new raw data format, develop more efficient scoring matrix to process the data, and write functions to provide more statistics such as cutting the data into finer intervals or grouping several dimensions together for data analysis. I am also working with another RA to find various ways to visualize the data and try to discern if there is any pattern in the data or potential correlations between dimensions. Meanwhile, I run the experiment myself as a participant to collect more perceptual testing data. Our goal is to find the ideal range of the dimensions’ settings with just-noticeable differences and try to provide clear boundaries of the terrains in different categories so that we could start the actual data collection on the category learning task.
* The other project I am about to start next week is on the mnemonic study and testing and modifying a computational model for the targeted memory reactivation data from Dr. Paller’s lab. The current model is an exponential memory decay model. We are testing the fit of the model to previous data collected in other lab. However, Dr. Reber found a group of data points showed strangely large TMR effect that might not be well explained by the model. My new task is to trace those data points from the raw data file, try to analyze and present the data in different ways and come up with a statistical reasoning to explain the peculiar behavior. I am trying to better understand the mathematical structure of the model and will start reading the code for the model. However, I don’t fully understand the mnemonic study and the underline neuroscience background. So, I will start finding papers about the study as well.
* Dr. Reber assigned two readings last week. The first one is a book chapter explaining the difference between declarative and non-declarative memory. Declarative memory is sometimes used synonymously with explicit memory. It refers to the conscious recall of the memories during retrieval and it depends heavily on the function of the medial temporal lobe. Non-declarative memory refers to the type of memory that operates outside awareness and it depends on a collection of different neural substrates. that could operate independently of the MTL. Several demonstrations of the non-declarative memory phenomena include category learning, serial reaction time task, artificial grammar learning and so on. Overall, non-declarative memory is a general principle of inherent plasticity in neural circuits that support different types of learning rather than a single coherent memory system.
* The other reading focuses on the usage of functional neuroimaging techniques in testing the theories of category learning. The indeterminacy between cognitive models made the development of categorical learning theories challenging. For example, in the dot pattern learning study, the prototype model and exemplar model would make identical predications about the response. But with the development of fMRI, researchers were able to identify neural activities associated with the category representation. For example, the fMRI scan showed reduced activity in early visual cortex for stimuli within a learned category, which supported the theory that multiple systems were involved in category learning and the category learning might be a non-declarative memory operating within visual cortex.
* These readings helped me to better understand the design of the terrain category learning task. The task is a mix of explicit perceptual learning and an implicit category learning paradigm. From the lab discussion, I learned that the difficulty of the category learning task needs to be finely tuned so that participants would not figure out the explicit rules. Consequently, mixing a challenging perceptual learning task into the category learning process would make the category learning harder and more likely to be implicit. However, we also need to make sure the difficulty level is reasonable so that the task is still learnable with the possibility of getting a correct response rate above 50%, preferably above 60%, after learning.
* I read chapter one, Neural Encoding and Decoding, from *Theoretical Neuroscience*. The chapter provided a good review of the neurons’ properties and communications between neurons through action potentials. This chapter is not directly related to the internship project yet. But it helped me see the close connections of the mathematical topics from the probability and mathematical statistics classes as well as the neuroscience knowledge from the physiological psychology class. This reading made a clear point that good model design really requires a thorough understanding of both subjects. The chapter briefly introduced how to apply different statistical models to produce different response turning curves and model the spike sequences, which inspired me to possibly apply the Gaussian and Poisson Distribution to both the terrain training data and the targeted memory activation data to see if it will provide additional insights about the data.
* I also read chapter one and half of chapter two from the *MATLAB For Neuroscientists* book. It gave a very helpful MATLAB tutorial that helped me to review some basic MATLAB functions as well as to learn the MATLAB graphing tools in a more systematic way. However, in Dr. Reber’s lab, most code is written in Python and we use the Python module, matplotlib, for data visualization. I am not very familiar with MATLAB plot nor have I used the Python plotting module before. So learning both languages’ plotting tools together will give me a good comparison of the two languages and learn to use proper scientific plotting tools to meet different requirements.