

Eye Movements and Subsequent Memory Effects in Ongoing Brain Activity

Summer student project for May-August 2020, co-supervised by Dr. Taufik A. Valiante, Dr. Jose Zariffa and mentored by Chaim Katz

Target Student Population(s)

Undergraduate student in Engineering, Neuroscience, Life Science in years 1-4. Preference will be given to students with prior experience with signal processing

Brief Project Description

Eye movements have been shown to be predictive of memory formation, for example, more eye movements on a scene can be predictive of if that scene will be remembered. In our lab, we have demonstrated that brain activity in the medial temporal lobe (memory related structures of humans) have significant alignment to ongoing eye movement during a memory task. We have collected data from participants with epilepsy with implanted electrodes in such structures performing a memory task. Learning about eye movements and its correlation to when a stimulus will be remembered may provide critical insight to how such memories are formed. We now wish to investigate the underlying neural activity that facilitate both scene memory and associated target to scenes. We will do this by analyzing the collected data. This project will involve using Matlab, Python and/or R for signal processing of brain activity, statistical analysis of behavioural effects and neurological activity and if interested possibility of helping with data collection.

Expected Learning Outcomes

Through this project, we expect you to learn the following -

1. Time frequency analysis of neural activity
2. Statistical modeling of behavioural effects and which features may contribute to memory formation
3. Framing a research question.
4. Effectively reading scientific literature to identify the current state of the art.
5. Writing scientific reports to report your developments and your findings.
6. Presenting your work to audiences from a diverse set of backgrounds at graduate research days and team meetings.

Expected Research Outcomes

Through this project, you will be contributing to an active research project in our laboratory and will be analyzing data that will be essential for future publication and data collection for this project. Successful completion of the project will result in the student receiving an authorship in a journal publication and possibly in other conference publications as well.

Required technical Skills

- Programming experience in Matlab
- Programming in R or other statistical analysis package would be an asset
- Experience with reading and critiquing scientific literature (optional)

Funding

Funding for this project may be obtained through competitive scholarship: [NSERC USRA](#) . It is the student's responsibility to apply in a timely manner, with the approval and assistance of their supervisor. Students may also apply to departmental awards for funding this research opportunity.

Application Details

To apply for this project, you must first complete the [IBBME USRA application](#) (Note: only need to do this once). Once you've done that, please email your updated CV and a statement of intent to Dr. Taufik A. Valiante (taufik.valiante@uhn.ca) , Dr. Jose Zariffa (Jose.zariffa@utoronto.ca), and to Chaim Katz (chaim.katz@mail.utoronto.ca). Explain briefly why you are interested by the project and its outcomes, and why you would be a good fit for this project. Please also provide your latest transcript (can be unofficial) to help us assess your chances to obtain funding. The subject of your email should be *"Summer Student Application: Subsequent Memory Effects Due to Eye Movements"*.