Innate Olfactory Avoidance: Optimization of a Novel System For Behavioral Analysis

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Introduction
For my first co-op, I worked as a behavioral research technician in the Datta Lab, in the Department of Neurobiology at Harvard Medical School. The Datta Lab is interested in understanding one of the fundamental questions in neuroscience - how is the brain wired to extract sensory information from the environment and produce behaviors? Using olfaction as a lens into this question, the lab hopes to better understand innate olfactory behaviors, the genes responsible for generating them, and the pathways that mediate them. Perhaps the most misunderstood part of this problem is behavior. The lab uses novel depth vision recording cameras in conjunction with custom analytical software and advanced time series modeling to understand behavior in a new context.

Outcome
I am fortunate to be able to celebrate many successes during my coop. I collected and analyzed vast amounts of behavioral data, of which we are now pairing through to include in publication. Including experiments done in collaboration with the Woolf Lab at Boston Children's Hospital, I have collected over 25 days worth of video data! Although collecting data was my main responsibility as a behavioral research technician, the Datta Lab fostered an environment for me to learn much more. With help from Alex Witlachko and Ofer Mazor, I learned many extremely valuable technical skills in materials engineering. Alex taught me all about different plastic and acrylic materials, their properties, and how to use them creatively and efficiently to construct experimental tools and arenas. Ofer Mazor taught me about advanced laser cutting and the use of other shop tools used for construction.

Activity
My duties as behavioral research technician were eclectic and plentiful. As one of my main projects, I was responsible for the optimization and engineering of a behavioral assay - the Odor Box. When the project began, I was given an iteration of the box, which worked moderately. Using various technical skills in materials engineering I acquired in the process, I was able to design a new iteration of the Odor Box which provided us clean and repeatable results. The design is now being used by other olfaction labs. I also performed a variety of other behavioral experiments designed to analyze effects of strain differences, predator odors, attractive odors, stimulant drugs (cocaine and amphetamine), and antipsychotics (clozapine and haloperidol).

Reflection
To summarize and reflect upon everything I have learned in the Datta Lab I should spend months drafting an essay. Aside from all the data collection, apparatus engineering, coding, and tangible skills, I learned most about my abilities and myself. Being a perfectionist at times, I often feel intimidated by new tasks because I may not be able to complete them perfectly or of high standard. Since starting, my supervisor, Alex, has pushed me to dive headfirst into complex problems by being resourceful, persistent, and quick to fail. Working at the Datta Lab has been like lifting weights, but for my brain. Confidence, work ethic, independence, resourcefulness, and my ability to problem solve. The work I encountered was not easy. Computer programming is hard. Science is hard. Fortunately, I was surrounded by a group of people that inspired me everyday to become a better scientist and to perceive. When I started in the lab, I mainly relied on direct direction from Alex to complete tasks and experiments. By the end of my co-op, I was a fully independent member of the lab, involved in design and creation of experiments, and other lab members relied on my behavioral data and intuition for their own projects. I'm honored to say that my stay in the Datta Lab has been extended indefinitely and I have been offered the opportunity to complete a senior thesis project in the lab. I have been included as an author on a poster and in the upcoming months I will be included as an author in a publication. I am ecstatic and grateful to continue learning, growing, and doing science in the Datta Lab!

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