Control of Brain on Social Behavior

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Introduction

The brain is one of the most complex regions in the body that is still being investigated for all of its functions. One of the brain regions that we look at this lab, the Anterior Cingulate Cortex (ACC), controls reward-guided decision-making. We look at various different tasks to see how certain behavior of rats corresponds to activity in the ACC.

Figure 1: An example of how an electrode may be implanted in the brain. Through this connection with the brain, our lab can look at the firing of neurons to determine if the ACC is activated when a certain behavior is being displayed. John Carnett/Popular Science https://www.nytimes.com/2011/05/17/science/17optics.htm [1]

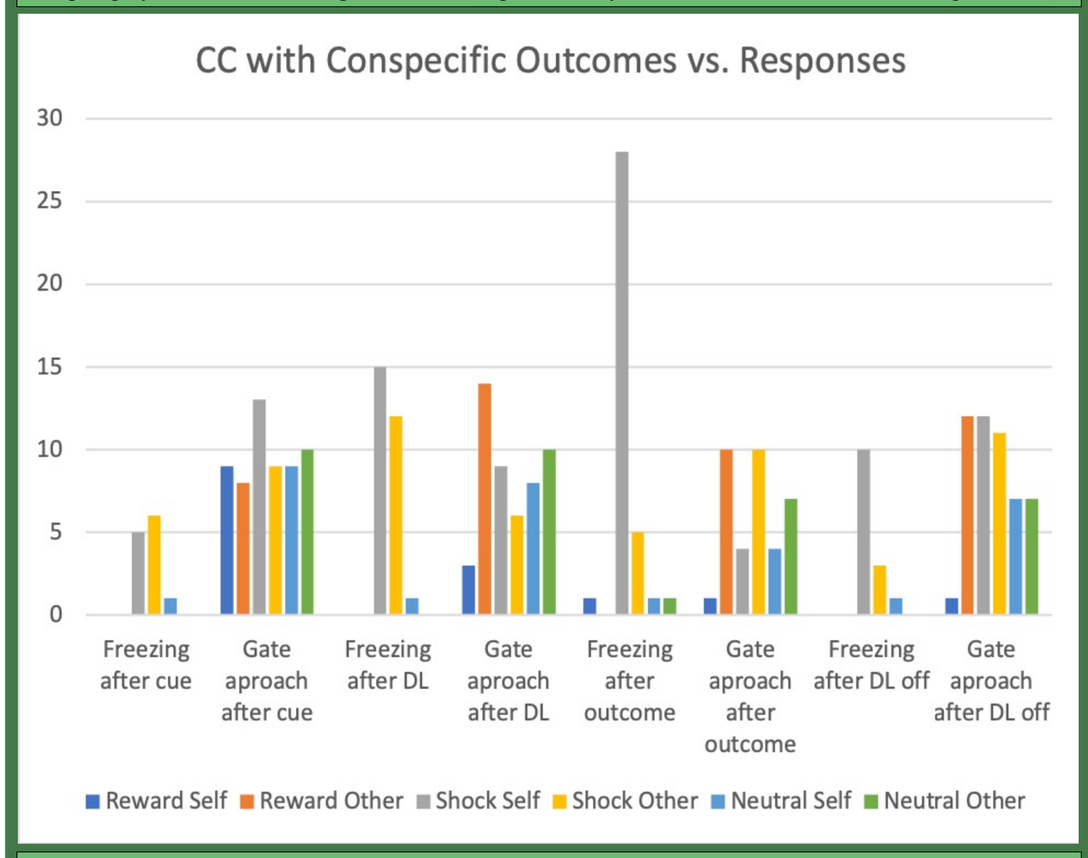

Figure 3: Data accumulation based on the videos that I scored during my lab time. Looking at freezing after outcome, we see a spike in the recording rat when they were shocked. We also see more approach during outcome when the other rat was shocked

Results:

I was able to gather totals for freezing and approach throughout the entire trial time. We see a large spike in freezing for shock of the recording rat, which is expected considering how humans may respond to shock. Looking at gate approach during the outcome, we see higher approach levels when the other rat was shocked, showing possible consolation for the other rat.

Methods:

We looked at a task where rats would be given one of three outcomes: reward, shock, or no outcome (neutral). The rats were conditioned to identify a noise cue that was associated with each of the three outcomes. After the noise cue was played, a light would turn on to represent whether the recording rat or the other (conspecific) rat was going to receive the outcome. 5 seconds after the light, the rat would receive the outcome and would be monitored 5 more seconds after the outcome was received. During these four phases (also depicted in Figure 2), I was tasked with observing whether the recording rat was freezing or approaching the other rat in the cage.

Takeaways from my experience:

- The brain and manipulation of the brain has always interested me, so working in this lab gave me the opportunity to explore it in a deep lens!
- Going through the scientific process, particularly observing certain behaviors and running tasks/data analyses to prove/disprove these ideas

Materials:

- 6 male and 6 female Sprague-Dawley rats
- Sucrose pellet (reward)
- Transparent cage
- Electrodes
- Fe-Ni-Cr Wires

Discussion

Based on the data, we are now currently looking at sex differences between the mice to gauge whether or not that higher approach is due to a prosocial behavior that one sex may posses more than the other. Through further analysis, there is also an increase in approach when the recoding rat is shocked Producing these graphs allow us to notice any new correlations which we can then test in a new task.

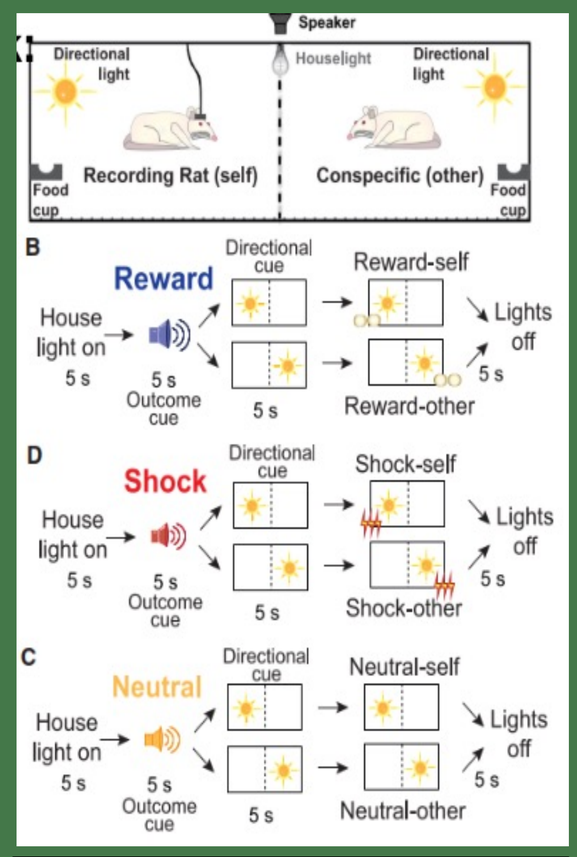

Figure 2: The behavioral task displayed as how it would be conducted within the lab. There are two mice in the cage, separated by a see-through divider.. Schneider et al., 2020, Current Biology 30, 1–12 October 5, 2020 a 2020 The Author(s). Published by Elsevier Inc.

Site Information:

Name of Site: Roesch Lab

Address: Biology-Psychology Building

Your supervisor: Dr. Matthew Roesch

The site mission/goals: To understand the behavioral circuits that result in reward-guided decision-making, reinforced learning, and executive control

Website: https://roeschlab.wixsite.com/roeschlab

Acknowledgments:

I would like to thank Dr. Roesch for letting me work in the lab during these pandemic times and explore optogenetics with behavior! I would also like to thank Dr. Holtz and Dr. Merck for keeping me engaged with global climate change and the future of our planet for these past two years!