Nose Poking vs. Lever Pressing in the Rat mPFC

Student presenter: Sherry Ye
Project advisor: Katherine Binder

The rodent medial prefrontal cortex (mPFC) is thought to be associated with a wide range of cognitive functions such as memory, decision-making, and goal-directed behavior. It can be further separated into two subregions, the prelimbic (PL) and infralimbic (IL) cortices. Common techniques employed to investigate functions of the mPFC often involve appetitive conditioning, in which the animals are conditioned to respond to a rewarded stimulus. In most cases, animal responses, such as learning to nose poke or lever press for reward, are assumed to be regulated by the same brain regions and thus utilized interchangeably in research. This study questions that assumption and hypothesizes that nose poking and lever pressing are different behaviors regulated by different subregions of the mPFC.

In order to do so, the study examined and compared acquisition of two common operant behaviors—nose poking and lever pressing—in rats trained on a fixed-ratio 1 schedule to respond to sucrose delivery by nose poking and lever pressing, respectively. The study also considered effects of PL inactivation by Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) on acquisition, extinction, and reinstatement of both actions. Though receptor expression was confirmed with immunohistochemistry, PL inactivation yielded no significant behavioral effects. Inherent learning differences between the two behaviors, however, were indicated by the disparity in the number of days rats spent acquiring the respective behaviors. Although preliminary, the results of the study suggest that a larger sample size and analysis of both subregions of the mPFC may help to elucidate the role of the mPFC in different learning behaviors.