**Operant Behavior Overview**

There are several key concepts one should understand. In short, the goal is to get the pig depending on the screen for the reward/reinforcer not the experimenter. The experimenter may facilitate initially, but the goal is to transition control of behavior over to the touchscreen quickly. Many online resources exist for a crash course on Learning as a formal topic in Psychology (e.g., Principles of Learning and Behavior by Daffin, 2019, free online).

**Reinforcer**

A reinforcer is something that *strengthens* the tendency for a behavior to occur. Positive and negative then refer to adding or subtracting a stimulus to gain this relationship.

* This can be a *positive reinforcer*, such as giving a sugar pellet
* This can be a *negative reinforcer*, such as removing an aversive stimulus
* Reinforcer does not necessarily equate to reward as non-rewarding stimuli can sometimes function as a reinforcer of behavior.

**Punisher**

A punisher is something that weakens the tendency for a behavior to occur. Again, positive and negative refer to adding or subtracting a stimulus

* This can be a *positive punisher*, such as an electric shock
* This can be a *negative punisher*, such as removing time to earn reinforcers

**Respondent / Classical / Pavlovian Conditioning**

In this type of learning, the organism associates two outcomes. Typically, a canonically reinforcing (e.g., sucrose pellet) or punishing stimulus (e.g., shock) is associated with a neutral stimulus. If these are repeatedly paired, this unconditioned neutral stimulus can come to elicit certain responses, thereby becoming a conditioned stimulus. Critically, the reinforcer is delivered *independent of the response*, and so even an organism not responding would receive the reinforcer.

This is often used as the basis to begin Operant conditioning using what’s known as Autoshaping – a procedure that pairs a reinforcer with presentation of a stimulus the animal can respond to. While the reinforcer is delivered regardless, it is immediately delivered if they respond to the stimulus (e.g., nose poke). Organisms tend to orient to these cues (a phenomenon known as “sign-tracking”).

**Operant / Instrumental Conditioning**

In this type of learning, a specific response or response pattern is shaped through reinforcement. This is the basis for a huge number of specifically-named tasks.

**Schedules of Reinforcement**

Several key schedules enable certain types of behavior. These can be useful depending on the type of task you are designing

* *Fixed Ratio* – One reinforcer is delivered after a fixed number of responses. FR-5 requires 5 presses to reinforcement. This is associated with a “pause and run” type of response where at higher ratios, organisms will break before running up the ratio again.
* *Fixed Interval* – One reinforcer is delivered *on the first response* after an interval elapses. FI-10 reinforces the first press after 10 seconds. This generates a “scalloping” or accelerating pattern of responses as the time interval approaches.
* *Variable Ratio* (also: random ratio) – One reinfocer is delivered after X number of presses *on average*. VR-5 requires an average of 5 presses to reinforcement. This generates a high, constant response rate
* *Variable Interval* (also: random interval) – One reinforcer is delivered after X seconds on average. VI-10 reinforces the first press after 10 seconds *on average*. This generates a modest, constant response rate.

**Method of Successive Approximations**

Complex behaviors will not occur without appropriate training. The goal of using this method is to shape behavior toward the desired end point. If the end point is making choices between two options, organisms must first be taught the type of response to make, then how to differentiate the options, then finally can be given a choice between them. This is key to all behavior training and optimizing this is the largest time saver in a study.