McGill

STANDARD OPERATING PROCEDURE #638

POSITIVE REINFORCEMENT TRAINING

1. PURPOSE

This Standard Operating Procedure (SOP) describes Positive Reinforcement Training (PRT) as a basic tool for animal training.

2. RESPONSIBILITY

Facility Animal Care Committee (FACC), veterinarians, veterinary care staff, Principal Investigator, and their research staff, animal care staff.

3. INTRODUCTION

Operant conditioning is a learning process where behaviors are modified through the association of stimuli with reinforcement or punishment. Behaviors are conditioned to occur or not occur depending on the consequences of the behavior. The operant conditioning learning model includes positive reinforcement, negative reinforcement, positive punishment, and negative punishment.

PRT is a form of operant conditioning that rewards animals with a pleasant or attractive reward when a desired behavior is performed making it likely that the animal will repeat the desired behavior in the future. The principles of PRT apply across animal species.

PRT can be used to achieve voluntary cooperation for targeted activities or procedures of the research protocol, husbandry, veterinary care, and diagnostic sampling. These targeted activities must fall within the natural range of behaviors of the species being trained.

In contrast, Negative Reinforcement Training (NRT) relies on removing an unpleasant action or aversive stimulus immediately after the desired behavior occurs to increase the frequency of the behavior occurring over time. The animal is more likely to repeat the desired behavior in the future because it fears or wants to avoid the unpleasant stimulus.

As per the Canadian Council on Animal Care (CCAC) guidelines, the use of PRT is highly preferred over other forms of animal training. Positive training alternatives should be exhausted before any kind of negative reinforcement is considered. When NRT must be used, this technique must be justified to, and approved by, the FACC.

PRT is an important means of promoting the welfare of laboratory animals. An animal that voluntarily participates in desired behaviors is less stressed and will serve as a better animal model. The need for physical restraint and/or the use of anesthesia, as well as the risks associated with those events, is reduced.

Personnel conducting PRT must be competent, with demonstrated expertise.

4. MATERIALS

4.1. Positive reinforcer: variety of treats, rewards

4.2. Conditioned reinforcer or Bridge, e.g., clicker

4.3. Target or items defined in shaping plan

4.4. Training logs

5. PROCEDURES

5.1. The primary method for PRT is shaping, which is the process of breaking a behavior into small, simple steps that build upon each other, eventually leading to the desired behavior. Depending on the species and temperament of the animal, some of the steps may require being broken down into even smaller steps.

5.2. Shaping plan

5.2.1. Prior to starting PRT, create a shaping plan tailored to each animal that includes the following:

5.2.1.1. Goal: define the desired end behavior.

5.2.1.2. Criteria: define what you want from the animal, how you want them to do it (e.g., sitting, standing etc..), for how long, etc.

5.2.1.3. Signal: determine the signal that will be used to the animal for the desired behavior, e.g. A hand gesture, a physical object, a cue word, etc.

5.2.1.4. Steps: determine the series of small increments or steps needed to learn the desired behavior.

5.3. Determine the rewards the animal likes best and note ones that are highly desirable; these can be used as big rewards. It is best to have a variety of rewards to choose from.

5.4. Pair a primary reinforcer, e.g., a favored treat, with a positive connection with your animal and your bridge (or neutral stimulus) such as a clicker, whistle, spoken word, etc. This will become the secondary or conditioned reinforcer.

5.5. Training

5.5.1. Training sessions should be documented.

5.5.2. Training sessions should occur frequently, ideally daily, and not last longer than 10 to 15 minutes. Consistency in training will yield better results; it may be advisable to limit the number of individuals involved in training each animal.

5.5.3. Only bridge or reinforce on the desired behavior.

5.5.4. Once the animal has established the desired behavior depending on the species, a cue can be added. The cue can be a word or specific gesture depending on the animal and/or your preference.

5.5.5. Once the animal is performing the task on cue, start to reward less frequently. It will help with repeating the desired behavior if the animal is expecting a reward but does not always receive it (similar to how a slot machine works).

5.5.6. Remember that training and learning are complex processes; progress is not linear. Regression is a normal part of training.

5.5.7. When ending the training session always end on a positive note. It may require regressing to a previous step that the animal knows well.

6. REFERENCES

6.1. National Centre for the Replacement, Refinement & Reduction of Animals in Research (NC3Rs) Guidance on Training Animals, 2014.

6.2. Bliss-Moreau, E., Theil, J. H., & Moadab, G. (2013). Efficient cooperative restraint training with rhesus macaques. Journal of applied animal welfare science: JAAWS, 16(2), 98–117. https://doi.org/10.1080/10888705.2013.768897

6.3. Laule, G. (2010). Positive Reinforcement Training for Laboratory Animals. In The UFAW Handbook on the Care and Management of Laboratory and Other Research Animals (eds R. Hubrecht and J. Kirkwood). https://doi.org/10.1002/9781444318777.ch16

6.4. Prescott, M. J., & Buchanan-Smith, H. M. (2003). Training nonhuman primates using positive reinforcement techniques. Journal of applied animal welfare science: JAAWS, 6(3), 157–161. https://doi.org/10.1207/S15327604JAWS0603_01

6.5. Canadian Council on Animal Care (CCAC) Guidelines: Nonhuman primates, 2019.