# Use of Operant Conditioning to Facilitate Examination of Zoo Animals

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**About This Column**

Behavior problems are a significant cause of death (euthanasia) in companion animals. While most veterinary practices are necessarily geared toward the medical aspect of care, there are many opportunities to bring behavior awareness into the clinic for the benefit of the pet, the owner, and ourselves. This column acknowledges the importance of behavior as part of veterinary medicine and speaks practically about using it effectively in daily practice.

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Even in a profession known for its recalcitrant patients, examination and treatment of zoo animals can be especially challenging. However, appropriate use of operant conditioning can greatly facilitate this process when it is used to train animals to reliably exhibit specific behaviors. While such training is necessarily time-consuming, it can save time, money, and even patients' lives, as administering anesthetics by blow dart into a distressed, running animal presents a significant anesthetic risk.

## TERMS AND DEFINITIONS

Operant conditioning is learning that occurs when behavior is affected by its consequences (see "How Animals Learn: Operant Conditioning," May 2006[a]). The animal learns that if it does or does not immediately exhibit a given behavior when given a specific stimulus, called an *eliciting stimulus*, there will be a specific consequence: another certain stimulus, the *controlling stimulus*, either will be present or will discontinue. The term *reinforcement* refers to operant conditioning paradigms in which the likelihood of the behavior being repeated increases, while the term *punishment* refers to paradigms in which the probability of a behavior recurring decreases. The term *positive* means that the controlling stimulus is present or offered if the behavior occurs, while the term *negative* means that the controlling stimulus is absent or removed if the behavior occurs. In working with zoo animals, positive reinforcement, in which the animal repeats a behavior because it learns that the behavior results in a specific, desirable, or pleasant consequence, is most commonly used (see the glossary on page 219).

The primary operant conditioning technique used to train zoo animals is called *shaping*. In shaping via positive reinforcement, the animal is reinforced for behaviors that are progressively more and more like the desired end behavior (see the box on page 223 for examples). This technique is used when the desired behavior, in its complete form, is unlikely to occur spontaneously so that it can be reinforced. Timing can sometimes be difficult, especially when working with wild animals, but use of a clicker or similar device can help. The clicker makes it possible for the trainer to make a brief, unique noise at the moment the animal engages in the desired behavior, regardless of whether it is possible to immediately provide a real or primary reinforcer. This sound becomes a secondary reinforcer: although a clicking sound is not normally something an animal would find pleasant or reinforcing, when it is consistently paired with a pleasant experience, it becomes a conditioned stimulus via classical conditioning (see "Classical Conditioning: Learning by Association," June 2006[a]).

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[a]Archived online at compendiumvet.com.

## Glossary

- **Desensitization** is the exposure of an animal to a stimulus that normally causes an undesirable response, but at such a low level of intensity that the undesired response does not occur. Over time, the stimulus is repeated with gradually increasing intensity, with the response remaining the same.
- **Extinction** of a positively reinforced behavior occurs when there is a period of time in which the animal is not regularly reinforced for exhibiting the behavior given the eliciting stimulus; in other words, the animal will eventually discontinue exhibiting the behavior.
- **Luring** is a technique in which a treat or some other item the animal is interested in following is used to facilitate the animal's moving in a desired way.
- **Positive reinforcement** is a form of operant conditioning in which the animal experiences a pleasant or desirable consequence if it exhibits a given behavior when a given eliciting stimulus (command) occurs.
- **Shaping** is a training paradigm in which the animal is reinforced for engaging in behaviors that are progressively more and more like the ultimately desired behavior.

## Key Points

- Through positive reinforcement and shaping, zoo animals can be trained to engage in a variety of behaviors that facilitate physical examination and treatment.
- Training requires weeks of regular practice and must be maintained through regular reinforcement of the desired behaviors.
- Usually, food is the best reinforcer. It must be highly motivating and appropriate to the individual animal and the species.

## FACTORS AFFECTING TRAINING SUCCESS

The primary reinforcer needs to be specific to the species and the individual animal. It should not just be desirable. It should be highly desirable. For some animals, a limited repertoire of reinforcers is fine, while for others, a variety of reinforcers, perhaps used in regular rotation, is more effective. For example, for a bobcat, chunks of meat are best, while bits of fish are acceptable. For otters, the opposite is true. Strawberries, grapes, and bits of apple are options for deer. Bears may respond best to an even more diverse set of offerings. As a general rule, simple "chow" or "kibble" will probably not be sufficiently motivating, nor will hay, if the animal is herbivorous.

Many day-to-day factors also influence how well an animal responds to attempts at training. Hunger versus satiation is always important and can be even more relevant in a zoo environment, when training times must be coordinated with regular feeding times. Many animals perform best if they are hungry. Therefore, training sessions should not be conducted right after the animal has had a full meal. However, some animals become more aroused and agitated if they are hungry and will not perform well in this situation. Weather and time of year are also relevant. Training when it is very cold, very hot, or raining does not proceed well with many species because the animal, like the trainer, is uncomfortable in the unpleasant environmental conditions. Animals that hibernate, such as bears, are not likely to make progress during the winter. Nocturnal animals are not likely to make progress during the day and are best trained at night or, if their day/night cycle is reversed by artificial lighting, when the red light of their artificial night is on. Simple behaviors that the animal will not find aversive can sometimes be fully trained in a few sessions, while complex behaviors that the animal finds even mildly aversive may require months of work.

When an animal has been successfully trained to perform a certain behavior, it is essential to maintain the behavior by regular practice. If training is discontinued, the behavior will eventually extinguish.

## OTHER CONSIDERATIONS

### Single Versus Multiple Trainers

Selection and education of trainers is an important consideration. Some zoos have the budget to hire personnel whose regular job requirements specifically include conducting animal training. Other zoos are on a much tighter budget and cannot hire more personnel than are essential to take care of the animals' basic needs. In the second case, volunteer trainers may be able to fill the gap. Because consistency of training over a long period of time is essential to success, volunteers involved in such projects must be committed to several training sessions each week for an extended period. Multiple people can train the same animal to perform the same behavior. In fact, having multiple trainers can be beneficial because the animal is then more likely to exhibit the desired behavior to anyone rather than to just one person. If a single person exclusively does all of the training, the animal may not respond to anyone else, making it impossible to affect the animal's behavior if the single trainer is sick, on vacation, or otherwise absent.

*(text continues on page 236)*

## Shaping Animals in the Zoo Setting

### Example #1: Caging a Bobcat

A bobcat needed to be trained to enter a cage where a door could be dropped so that it could be examined. The bobcat lived in a wooded zoo habitat and had begun staying away from the cage when humans were near, presumably to avoid capture. Training began with the trainer standing outside the habitat fence and tossing bits of meat into the enclosure. Eventually, the bobcat investigated the meat. As it ate, the trainer made a "click" with a clicker. Repeated pairings of the clicking sound with the consumption of a treat turned the clicker into a secondary reinforcer.

When the bobcat was consistently approaching tossed treats, which coincidentally resulted in its approaching the trainer, movement toward the trainer was reinforced with a click, and the word *come* was added. Importantly, the behavior was trained before the word that was to be the eliciting stimulus was added. Now, the first step in shaping the bobcat toward the ultimate, desired behavior was initiated: the meat chunks were tossed shorter and shorter distances so that the bobcat had to be willing to come closer to the fence to receive a reward. This was a gradual process that took many training sessions.

When the bobcat was coming all the way up to the fence, the next step was to teach it to sit on command. This was accomplished by waiting for it to sit, then clicking and tossing it a treat. Again, once the behavior was established, the eliciting stimulus, or command—in this case, the word *sit*—was added. Once the bobcat consistently came up to the fence where the trainer was and sat on command, the trainer began gradually moving up and down the fence line. Over many sessions, the bobcat learned to alternately follow the trainer and sit at various locations along the fence of its housing. This exercise was carried out for a long time so that the bobcat became confident that the training sessions would consistently be rewarding, pleasant experiences. Eventually, the trainer began progressing toward the cage with the drop door. Over a period of weeks, the bobcat learned to follow the trainer to the cage. Finally, the trainer could go directly to the cage at the beginning of the training session and the bobcat would enter. This training required several months, in part because of a regular turnover of volunteer trainers.

### Example #2: Backing a Doe

The doe described in this column also had a habit of crowding visitors, a potentially dangerous behavior, especially if the visitors were young children. Therefore, it was trained to "back," using traditional shaping. In this case, the technique of luring was used. A treat was held at the doe's nose, and the doe was allowed to eat until it learned that the hand was a source of food. Then the treat was held under its chin so that it had to move its chin and mouth back to obtain the treat. Gradually, the treat was held farther and farther back until the doe had to take a step backward to get to the treat. The word *back* was paired with the behavior as was *sit* in training the bobcat. With continued training, the doe was required to take progressively more steps before it received the treat.

**Figure 1. The bobcat in the capture cage.** The raised drop door can be seen above the trainer's extended arm. In this photograph, the bobcat is being taught the command *stand*. This command allows the animal's abdomen to be superficially examined. The trainer is Dr. Sabrina Poggiagliolmi, a veterinary behavior resident at The University of Georgia.

**Figure 2. Dr. Poggiagliolmi gives the doe a treat.**

**Understanding Behavior** *(continued from page 219)*

### Commands and Communication

If multiple trainers work with the same animal, they need to communicate on a regular basis regarding what training is being conducted and how the animal is progressing. They should select command words for specific actions that are simple for everyone to remember and are relatively unique to the vocabulary of the people interacting with the animal. For example, in the case of a tame doe that was resistant to restraint for physical examination, the word *hug* was selected as the command for it to stand still while someone held it. Gradual desensitization to being held was necessary, with the desired behavior being simply that the doe remain still. In the initial stages, the trainer reached around the doe's neck without making contact. If the doe remained still, it received a grape or other treat. Gradually, the trainer made increasing degrees of physical contact with the doe, beginning with a light touch and slowly progressing to firmer contact. At all times, the doe was rewarded for remaining still while increasing levels of contact and restraint were experienced.

### Training to Accept Undesirable Consequences

Maintaining training of behaviors and interactions that do not involve eventual pain is easier than maintaining training of behaviors that occasionally result in pain. Nevertheless, the latter is possible (e.g., training a monkey to hold its arm out while a blood sample is taken). For such interactions, it is important that the behavior is well established with a large number of pleasant experiences before pain is experienced. After the animal experiences a painful consequence of the behavior, it should immediately be given a reinforcer, followed by continuing training with regular positive reinforcement. If modest pain is only occasionally experienced as a consequence of engaging in the behavior, while very pleasant consequences are experienced hundreds of times, maintenance of behaviors that facilitate diagnosis and treatment with minimal use of restraint and medications can be accomplished.