



USE OF POSITIVE REINFORCEMENT TECHNIQUES IN PRIMATES TO ENHANCE ANIMAL CARE, RESEARCH, AND ENRICHMENT

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There is a growing trend in the zoological and biomedical community to recognize the use of operant conditioning techniques as a valuable animal care and management tool. (Baker, 1991) (Reichard, 1992) (Priest, 1991) (Laule, 1993) (Reinhardt, 1990) Operant conditioning offers two basic alternatives for influencing behavior: positive reinforcement, and negative reinforcement or escape/avoidance. As animal training consultants we advocate and teach positive reinforcement training. Animals are reinforced with rewards they like for the desired behavioral response. Operationally it means that we exhaust the positive alternatives before any kind of negative reinforcement is utilized. On the rare occasions when an escape/avoidance technique is necessary, it is kept to a minimum and balanced by positive reinforcement the vast majority of the time. Punishment is only used in a life threatening situation for person or animal.

Positive reinforcement training does not require any food deprivation. Animals are fed their daily allotment of food, and rewards for training utilize that diet, or consist of extra treats. Finally, this training relies on voluntary cooperation. by the animal to succeed.

Positive reinforcement training is very adaptable. We have used these techniques with everything from great apes, baboons, and other primates, to elephants, canids, felids, ungulates, and more. In fact, the specific techniques I am suggesting originated in the training of marine mammals for public presentations. It is relevant to this discussion to understand how the application of these techniques evolved from training sea lions and killer whales to perform spectacular behaviors in an oceanarium show, to training primates to voluntarily cooperate with veterinary procedures in a biomedical laboratory.

In oceanariums, positive reinforcement training is the primary strategy for meeting behavioral objectives and solving problems. For example, to successfully work two adult male sea lions together in shows requires addressing the social dynamics between them. Without training the dominant animal to work cooperatively with the subdominant animal, the result is frequent show-stopping fights between them. Similarly, working dolphins in groups requires training dominant animals to allow more timid animals to eat and work. (Laule, Desmond, 1991)

When the objective is to improve animal health care through more frequent and less stressful physical examinations and sample collection, animals are trained to voluntarily cooperate in a variety of veterinary procedures including: sample collection of blood, stomach contents, feces, blow hole cultures, and urine; physical inspection; and ultrasound examinations.

Finally, novel problem situations are addressed through training methods. For example, when a female killer whale demonstrated good mothering skills except for the ability to nurse her calf, two behavioral strategies were employed. She was trained to allow human manipulation of her mammarys in order to collect milk samples. She was also trained to chase down and present her mammarys to a fiberglass model of a calf that was manually propelled around the pool by her trainers. (Desmond, 1985)

When sea lions were required to work directly with the public on- and off-grounds for publicity events, the strategy focused on desensitization training. The animals were trained to tolerate every conceivable sensory event they might encounter: different substrates, strange or sudden noises, unusual sights, new locations, and crowds of people. The result was animals that were comfortable and unstressed by novel events. (Laule, 1983)

The marine mammal training program just described illustrates the potential benefits of integrating positive reinforcement training into a practical and comprehensive approach to animal care. The basic techniques are the same for all animals, with minor adjustments made for species differences, individual animal differences, different environmental and social situations, and specific operational objectives.

Careful application of positive reinforcement techniques can address a variety of husbandry, veterinary, and research needs with primates. (Laule, 1990) For example, through the process of desensitization animals learn to tolerate scary or uncomfortable stimuli. In very basic terms, desensitization is a process designed to train out, or overcome, fear. By pairing positive rewards with any action or object that elicits fear, that fearful entity slowly becomes less negative, less scary, and less stressful. The result is primates that cooperate in physical examinations including offering body parts for inspection and treatment of wounds, tolerating a stethoscope and thermometer, and allowing blood sampling, urine collection, and injections.

Multiple benefits are derived from training animals to voluntarily cooperate in husbandry and veterinary procedures. (Bloomsmit, 1992) First, data collection can be improved by gaining the ability to collect samples in a shorter period of time, more often, with greater reliability, and fewer staff. Second, the use of anesthesia can be greatly reduced, improving the quality of sample collection and reducing the physical risk to animals as well as the accompanying stress. Third, peripheral behaviors such as reliable shifting and separation, entering transport or squeeze cages, and positioning in a particular location can be trained to facilitate sample collection.

Training can be utilized to enhance the likelihood of successful introductions and social housing of primates. It is possible to effectively mitigate dominance-related problems, reduce aggression, and access submissive animals. As with the sea lions and dolphins, socialization issues like these can be addressed by utilizing a technique we call "cooperative feeding". Operationally it entails reinforcing two events simultaneously: dominant animals are reinforced for allowing subdominant animals to work and receive

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food or attention, while the subdominant animals are reinforced for being brave enough to work and accept food or attention in the presence of these more aggressive animals.

This was one successful strategy used with a group of five drill baboons at the Los Angeles Zoo. (Desmond et al, 1987) The primary goal of the project was to increase positive social interactions and reproduction among the group members. So animals were cooperatively fed in different dyads and triads, reinforcing them for eating and relaxing in close proximity to one another. To encourage reproductive behavior the dominant male was reinforced for touching the dominant female, and she was simultaneously reinforced for allowing him to touch her. Animals were also trained to voluntarily cooperate in artificial insemination procedures like tube insertion and semen collection. Results of the seven month project show significant increases in all forms of affiliative behavior including grooming, inspection, and mounting during and following the project. (Cox, 1987)

Another study conducted at the M.D. Anderson Science Park chimpanzee breeding facility in Bastrop, Texas documented the reduction of excessive aggressive behavior of one male chimpanzee toward other group members during feeding time through the use of training techniques and cooperative feeding. (Bloomsmith, 1992) The eight animals live in a large open corral, where produce is fed from the wall above. The male was trained to sit during feeds then reinforced with special treats for allowing the others to receive and consume their allotted food. Both aggressor and subordinate animals benefited. Statistical results indicate significant reduction in the levels of display, submission, and aggression during feeds as a result of the training.

Training can be useful in addressing other animal care issues. Aggression towards caregivers can be dealt with behaviorally. Abnormal behavior can be reduced or eliminated by training a behavior that is incompatible with the problem one, or a new behavior to replace the undesirable one, or simply raising the amount of activity and stimulation for the animal. (Laule, 1987)

Finally, positive reinforcement training can serve as an effective enrichment strategy, contributing to the psychological well-being of captive primates. (Laule, 1992) Novak and Suomi suggest that psychological well-being be generally defined as "the ability to adapt - to respond and adjust to changing situations." (Petto et al, 1990) Of the many observable features that relate to it, such as behavior, health, reproduction, longevity, etc., they suggest that a combination of two or more should be used in assessing psychological well-being. Utilizing that criteria, one could argue that techniques like desensitization and cooperative feeding, and the behavioral results they attain, enhance psychological well-being. Consider other subtle, yet important benefits as well.

Animals are made to act on their environment. However, captivity eliminates the need, and in many cases the opportunity, for animals to perform purposeful behaviors that contribute to their survival. (Hediger, 1950) The conditions and restrictions of most laboratory research offer animals little choice and control over their lives. Positive reinforcement training provides opportunities to give some of that back. Training offers animals a chance to work for their food. Laboratory studies have shown that given a choice, animals will most often voluntarily work for their food, even if the same food is available free. (Neuringer, 1969; Stevens, 1978)

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Training is based on voluntary cooperation. Restraining an animal for a procedure, or having an animal voluntarily cooperate with the procedure without restraint, are two very different events, for the animal and for personnel. Because the trained animal is a willing, active participant in the process, it gains greater choices and control. The most dramatic example is the primate that, given the choice, voluntarily presents his arm for an injection. Prior to training, the animal had no choice. If an injection was required, the animal would be injected, most likely by a rather negative method, and incur the accompanying stress. Furthermore, since training focuses on desensitizing the animal to the procedure, the injection itself becomes less scary and stressful. So, when the animal must get that injection, having a choice in how that event happens, and being less fearful of it, contributes to that animal's psychological well-being.

Training offers mental stimulation for animals. Training is teaching; being trained is learning. It is a problem-solving process more challenging and rewarding than the most complex enrichment device. To a great extent, this is because training provides a stimulating human/animal interface. One recent study documented the impact of human/animal interaction, with positive outcomes such as reduction of abnormal behavior resulting from as little as six minutes interaction per week. (Bayne et al, 1993)

Operationally, training can be used in conjunction with enrichment activities to expand the usefulness of devices. In fact, how many times have enrichment devices been discarded because the animals did not use them? A relevant question might be, did they know how? In one case, four adult male chimpanzees never used their pipe feeders (PVC pipes attached to the outside of the cage, filled with apple sauce, jello, or some other treat which require the animals to use sticks to access the treat). Eventually the caregiver stopped giving them the feeders. However, once two of the chimps were trained to use the feeder, they have all subsequently used it. (Laule, 1992)

The pipe feeder training was part of a study to assess the enrichment value of positive reinforcement training. (Bloomsmith, 1992) Conducted at the M. D. Anderson Science park, the four chimps were observed in a baseline period before training, during training sessions where they were worked primarily on husbandry behaviors, and during non-training times. Preliminary results show that during sessions approximately 40% of each animal's time was spent in positive interactions with the trainer. Less than 1% of their time was spent ignoring or aggressing the trainer. In fact, animals remained involved in the sessions, even when they weren't directly being trained. Preliminary results also show that three positive changes occurred during training: reduced self-directed behavior, reduced inactivity, and increased social play. Each of these behavioral changes is typically considered to be a positive outcome of an enrichment procedure.

Training, for all its benefits, has its limitations. It is not a cure-all or magic formula for solving every behavioral problem or meeting every operational need. It is simply a useful tool. If training has a down side, it is two-fold. First, training is a skill that takes time and practice to develop. Poorly planned and implemented training can create more problems than it will solve. Second, training is time and labor intensive, especially in the initial stages of a project. However, if viewed in the longterm, those drawbacks can be turned into pluses. Training skills translate directly into problem solving skills. Therefore, skilled trainers can make optimum animal caretakers. And training results, like animals cooperating in veterinary procedures, in the long run are time and labor saving.

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Despite these limitations, the biomedical community can benefit by integrating simple positive reinforcement techniques into overall management practices. Start with caregivers and daily husbandry routines. Give animals the chance to voluntarily cooperate in basic behaviors such as moving from cage to cage, allowing something to be removed from the cage, or approaching the cage front when called. Then reward the animal for compliance. Little food treats that can be carried in a pocket, a squirt of juice, an enrichment toy, or verbal praise make good reinforcers. As a general rule, always try positive reinforcement first, before moving on to negative reinforcement.

Next, identify opportunities for specific behavioral intervention. An up-coming protocol, a chronic health problem, an abnormal behavior that threatens the safety of animal or caregiver are all situations that warrant greater effort. If possible, identify individual staff, like an enrichment technician, who can develop training skills and then utilize them with a variety of animals. An integration of enrichment strategies and training techniques is the most effective way to use limited resources for maximum benefit. In fact, when possible use enrichment strategies, devices, toys, games, and feedings as reinforcers after stressful events.

Finally, to realize all the benefits that positive reinforcement training can offer, it must become an integral component of your animal management system. At M. D. Anderson Science Park a formal animal training program is being conducted with the stated purpose of integrating the use of positive reinforcement techniques into the management of the colony of 150 chimpanzees. (Laule, 1992) An on-site dedicated trainer conducts most of the new training, with the staff of 8 caregivers maintaining the behaviors once complete. All caregivers use basic positive reinforcement in their daily cleaning and husbandry activities, and individuals are beginning some new training as well. The key to the success of this program is the whole-hearted support by the Director, colony manager, veterinarians, and technicians. A recent reorganization combined training and enrichment activities into one section, under the direction of the behavioral researcher. This program is a working model for other primate facilities that strive to enhance the effectiveness of behavioral, husbandry, health care, investigative, and environmental enrichment programs through the use of training techniques.

In conclusion, positive reinforcement training is gaining stature among animal care professionals as a useful tool for enhancing animal care and husbandry needs. A strong case can be made that training is good for animals. Whether the situation involves a singly-housed primate with limited sensory stimulation, or a group of animals in a naturalistic environment, well planned and implemented training has a place.

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