

Enhancing Nonhuman Primate Care and Welfare Through the Use of Positive Reinforcement Training

Gail Laule and Margaret Whittaker

Active Environments

Lompoc, California

Nonhuman primates are excellent subjects for the enhancement of care and welfare through training. The broad range of species offers tremendous behavioral diversity, and individual primates show varying abilities to cope with the stressors of captivity, which differ depending on the venue. Biomedical facilities include small single cages, pair housing, and breeding corrals with large social groups. Zoos have social groupings of differing sizes, emphasizing public display and breeding. Sanctuaries have nonbreeding groups of varying sizes and often of mixed species. In every venue, the primary objective is to provide good quality care, with minimal stress. Positive reinforcement training improves care and reduces stress by enlisting a primate's voluntary cooperation with targeted activities, including both husbandry and medical procedures. It can also improve socialization, reduce abnormal behaviors, and increase species-typical behaviors. This article reviews the results already achieved with positive reinforcement training and suggests further possibilities for enhancing primate care and welfare.

In the 22 years since the Animal Welfare Act mandated that facilities housing nonhuman primates must provide for their psychological well being, positive reinforcement training has achieved wide recognition as a valuable tool for contributing to that objective in a variety of ways. The application of positive reinforcement techniques to specific aspects of the management of nonhuman animals in captivity spans a wide range of species, social contexts, and housing situations—from biomedical facilities to zoos to sanctuaries. Social and housing contexts for primates in captivity range from single or pair housing, to large breeding or

nonbreeding groups, to multispecies exhibits. Positive reinforcement training is a proven method for enhancing the care and welfare of primates in all of these situations (Laule, 2003; Schapiro, Bloomsmith, & Laule, 2003; Young & Cipreste, 2004). Circumstantially supporting this view is the still-lengthy waiting list for the Primate Training and Enrichment Workshop cotaught by the authors, recently presented for the 16th time in 15 years.

As training has become a recognizable contributor to enlightened captive animal management, the greatest benefits have come from three areas of application:

1. Improved husbandry and medical care through voluntary cooperation by the animals in a wide array of procedures.
2. Enhanced social management through training techniques that increase affiliated behaviors and decrease aggression.
3. Improved psychological well being through desensitization techniques that directly address fear and discomfort.

This article reviews the results already achieved with positive reinforcement training and suggests additional possibilities for using such training to enhance social management and to address fear and discomfort.

HUSBANDRY TRAINING

There are many published articles on the benefits of positive reinforcement training in gaining the voluntary cooperation of primates in husbandry and medical procedures. Since 1984, we ourselves have written more than 20 different papers, chapters, and conference presentations on the subject (Laule, 1984, 2003; Laule & Desmond, 1995; Laule & Whittaker, 1998, 2001; Whittaker, in press). Husbandry and medical training can desensitize animals to the fear and discomfort of procedures such as receiving an injection or having blood drawn, so the events become less frightening and less stressful. Animals gain the opportunity to cooperate voluntarily, rather than having to submit to anesthesia or restraint (Bloomsmith, 1992; Reichard & Shellabarger, 1992; Reinhardt, 1997). With greater accessibility to more cooperative animals comes the opportunity to initiate preventive medicine practices and to explore techniques previously seen as less practical for routine use, such as ultrasound or tube insertions for artificial insemination (Desmond, Laule, & McNary, 1987; Logsdon & Taylor, 1995). Voluntary cooperation in husbandry and medical procedures significantly reduces an animal's level of stress (Lambeth, Hau, Perlman, Martino, & Schapiro, 2006; Loehe, 1995; Reinhardt, 1992; Videan et al., 2005); by reducing the need to separate an individual to accomplish a task, it also causes less disruption for the entire group (Reinhardt & Cowley, 1992; Stone, Bloomsmith, Laule, & Alford, 1994).

With positive methods proven to allow necessary husbandry and medical care for captive animals, it is increasingly difficult to defend the use of negative reinforcement or escape–avoidance techniques to achieve the same goals. Subjectively, one can compare the behavior of a primate calmly accepting an injection to that of an agitated animal racing around the cage after spotting a dart gun. Objectively, one can compare the number of anesthetizations needed to collect blood from an adult chimpanzee who cooperates voluntarily (none) with the number needed to collect blood from an untrained animal (one per blood sample). Both the subjective and objective assessments make a strong case in favor of the positive impact husbandry training has on an animal’s well being.

SOCIALIZATION

Many species of primates are difficult to maintain in species-typical social groupings in captivity. Common problems include high levels of aggression, serious wounding during introductions (Erwin, 1979), and a lack of appropriate social skills. Objectives for training to improve the socialization of primates include (a) meeting the social needs of all group members, (b) reducing aggression to acceptable levels, (c) increasing positive social behavior, (d) facilitating the introduction of new animals into an existing group, and (e) gaining access to all individuals in the group. Positive reinforcement training offers specific methods to achieve each of these objectives.

Target Training

Targeting can elicit both gross and fine movements and teach animals to hold a position or location. Greater access to all individuals within the group is available when all group members will come to, go to, and stay at targets. The stationing of dominant animals lessens the possibility that they will interfere when subordinate animals receive food, enrichment, or medical attention.

Shifting Between Enclosures

Training animals to shift quickly and reliably at any time of day ensures the safety of the staff and the animals and facilitates sound husbandry practices. It also allows reinforcement of the group for moving simultaneously. Such reinforcement may promote a more cohesive group, which responds collectively toward a common goal.

Separation

Separation and temporary isolation of group-housed primates for management or veterinary reasons can cause undue stress for all members of the group and may trigger problems during the reintroduction of separated individuals. Training animals—as individuals or as subgroups—to separate voluntarily can facilitate the movement of animals into and out of the group and minimize the stress of separation. Voluntary separations also provide subordinate animals the occasional chance to escape the pressures of social housing.

Cooperative Feeding

Cooperative feeding is a technique used to enhance positive social behavior and reduce agonistic behavior in many species, including a variety of primates (Bloomsmith, 1992; Bloomsmith, Laule, Thurston, & Alford, 1994; Cox, 1987; Desmond et al., 1987). Rummel (1977) suggests that aggression is an acquired, instigated, maintained, and modified behavior. Success in satisfying one's wants or needs will reward aggression; if nonaggressive behavior is less successful in achieving satisfaction, aggression will increase. Dominant nonhuman primates receive reinforcement, both in the wild and in captivity, for managing the groups they lead, monitoring other group members, and acting as sentries. Many caregivers of captive animals have used subterfuge and distraction when attempting to provide subordinate animals with food, enrichment, or other desirable resources. However, these techniques actually exacerbate aggression, causing dominant animals to become more vigilant to maintain control of the desirable resources. In captivity, aggressive interactions can have serious consequences if group members are unable to escape the aggressors.

Cooperative feeding conforms to operant conditioning theory, which states that the consequences of a behavior determine whether it will recur (Pryor, 1999). In cooperative feeding, the dominant animal receives reinforcement, in the form of desirable foods whenever the subordinate animal receives these resources. This technique reinforces the dominant animal for behavior that is cooperative rather than aggressive, thus strengthening cooperative behaviors. At the same time, additional training can reinforce affiliative behaviors: close-proximity, greeting, grooming, and reproductive behaviors. When consistently and skillfully applied, cooperative feeding has two positive outcomes: (a) The dominant animal becomes less aggressive and more tolerant, and (b) the subordinate animal becomes less fearful and more willing to accept rewards previously refused when the dominant animal was watching.

Gentle Touch and Proximity

Gentle touch and proximity behaviors introduce the concept of touching the target gently. Directing this behavior toward another animal can elicit behaviors such as

touching, grooming, mounting, and breeding (Desmond et al., 1987). Gentle touch may be especially helpful in managing introductions and encouraging affiliative behaviors. Desmond & Laule (1984) reported positive results using this technique during the introduction of a silverback gorilla to a group of adult females, infants, and one hand-raised juvenile female. In addition, in the first study examining the effects of socialization training, Cox (1987) documented increases in all forms of affiliative behaviors after gentle-touch training sessions with a group of drills (*Mandrillus leucopheus*).

Shared Goal-Directed Training

We use the term, *shared goal-directed training*, to describe the latest concept in socialization training. This concept involves rewarding collaborative efforts to train animals to work together toward a common goal. The technique began with the training of cetaceans to perform group show behaviors requiring a coordinated effort, and it involves rewarding the animals as a group. Therefore, if even one animal fails to perform the behavior to criterion, the group may not receive reinforcement.

Purposefully using shared goal-directed behaviors to create social ties may enhance overall socialization. At one oceanarium, during a group “high bow” behavior, a hydrophone recorded vocalizations from multiple bottlenose dolphins during their underwater swim, then one single voice just before all the animals broke the surface of the water at the same time (T. Desmond, personal communication, May 16, 2006). W. Philips (personal communication, May 20, 2006) reported that group-behavior training seemed to result in the formation of alliances between dolphins from different subgroups, who then appeared to socialize more with each other. Similar results might be possible with primates using such shared goal-directed behaviors as retrieving an object too cumbersome for one animal to handle, passing objects between or among animals, and procuring food rewards under conditions requiring cooperation.

ADDRESSING FEAR AND DISCOMFORT

Forthman & Ogden (1992) have cautioned animal managers never to assume, without supporting data, that animals have become habituated to routine procedures and handling. Their concern stems from studies on primates in laboratories, conducted nearly 20 years ago by Line, Clarke, & Markowitz (1987) and Line, Morgan, Markowitz, & Strong (1989). These studies found prolonged alterations in heart rates and cortisol levels after such routine procedures as cage cleaning.

Desensitization

Desensitization is a very powerful, versatile, and valuable training technique for reducing anxiety when an animal demonstrates fear or discomfort associated with a particular event, person, situation, location, or object (Laule, 2003). The training process pairs positive reinforcement with the frightening event or object. Establishing a direct relationship between the fear-inducing stimulus and the positive reinforcers causes the fear to diminish over time.

The necessity of desensitizing an animal to all aspects of a veterinary procedure is apparent. An animal will not cooperate voluntarily if a procedure induces fear. Analyzing the physiological responses to voluntary and involuntary injections in chimpanzees, Lambeth et al. (2006) found that cortisol was significantly higher in the involuntary condition and hypothesized that the voluntary condition reduced anxiety by giving the animal greater choice and control.

Desensitization may also provide significant assistance in managing social behaviors. For example, Brain and Benton (1981) divided aggression into categories such as self-defensive behaviors and parental-defensive behaviors, and Moyer (1968) characterized types of aggression as fear-induced, territorial, and maternal. These descriptions share a common thread of fear, discomfort, uncertainty, and apprehension. In the previously cited gorilla introduction carried out by Desmond and Laule (1984), the use of cooperative feeding and desensitization techniques with both the females and the silverback helped achieve a peaceful outcome, showing that desensitization can, in fact, successfully reduce the potential for aggression by addressing social stimuli that might otherwise produce fear.

CONCLUSIONS

To date, the use of positive reinforcement training techniques with primates has a fairly lengthy history and an impressive list of documented benefits. In fact, it is difficult to conceive of a convincing argument against the use of such training to achieve voluntary cooperation in husbandry and medical procedures and/or to enhance socialization and decrease aggression in these highly social animals. Because training is a useful tool, offering very real options for addressing the negative consequences of captivity, every animal facility should integrate training strategies into its management systems and teach training techniques to its staff.

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