



THE USE OF POSITIVE REINFORCEMENT TECHNIQUES IN THE MEDICAL MANAGEMENT OF CAPTIVE ANIMALS

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Positive reinforcement training is gaining acceptance as a valuable animal care and management tool to aid in husbandry activities, veterinary procedures, and research protocols. The benefits of such work include less stress on the animals, greater flexibility and reliability in data collection, and a reduced use of anesthesia. This paper presents examples of the use of training techniques to address various medical situations in a number of species in the zoological setting.

The comprehensive use of positive reinforcement training has revolutionized the way we care for captive animals. By using recognized techniques, many tangible results and benefits can be achieved. Animals are desensitized to frightening or painful events, like getting an injection, so the stress associated with these events is significantly reduced. Animals gain the opportunity to voluntarily cooperate in these procedures, rather than being forced. With a greater accessibility to more cooperative animals comes the opportunity to initiate preventative medicine practices and to explore techniques that previously were seen as less practical, such as ultrasonography or tube insertion for assisted reproduction. With this cooperation comes a reduction in the use of restraint and anesthesia. Many husbandry and veterinary procedures can be implemented with less disruption to all animals by reducing the need to separate animals from social groups, and by training them to separate voluntarily. Finally, experience has shown that trained animals maintain a high degree of reliability in participating in these procedures and are less stressed while doing so.

METHODS

The training method referred to throughout this paper and recommended as the approach of choice, is positive reinforcement training. Animals are reinforced with pleasurable rewards for the desired behavioral responses. Operationally, this means that the positive alternatives are exhausted before any kind of negative reinforcement is used. On the rare occasion 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, which by definition is used to eliminate a behavior, is only appropriate in life threatening situation for person or animal. To dispel a common misperception, positive reinforcement training does not require any food deprivation. Animals are fed their daily allotment of food; rewards for training use that diet or consist of extra training treats. Finally, this training relies on voluntary cooperation by the animal to be successful.

Through a process termed desensitization, animals learn to tolerate presumably scary or uncomfortable stimuli. In 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 presumably less stressful. Using this technique, animals have been desensitized to husbandry and veterinary procedures, new enclosures, unfamiliar people, negatively perceived people like the

veterinarian, novel objects, strange noises, for example construction noise for exhibit renovation, and other possible aversive stimuli. In fact, we have previously reported that animals being desensitized to specific stimuli can, over time, generally tolerate anything novel or unexpected.

INJECTIONS

One of the most useful applications of husbandry training is the conditioning of animals to voluntarily accept injections. When training an animal to accept an injection, the feeling of a needle piercing the skin is potentially painful, and previous exposure may make this a frightening experience as well. Effective desensitization requires pairing many positive rewards directly with that experience, or with a similar experience. Training may include pairing positive rewards with the experience of being touched with a progression of items, starting with the trainer's finger, then a capped syringe, then a needle with the end cut off so it is blunted, and finally the real needle. The animals must experience this over and over again, with the touch slowly moving from very light to the final experience of actually piercing the skin. If desensitization is done well, the animal will voluntarily accept the injection and recognizable signs of stress and fear will be diminished or absent. To date injection training has been successfully implemented with many different species and it continues to be a priority behavior for many zoos.

HUSBANDRY TRAINING OF ELEPHANTS IN PC

Protected contact, as a system for managing elephants, is based on the use of positive reinforcement techniques. All elephants in protected contact should be trained on a wide variety of husbandry behaviors that include: skin care, body exam, tusk trims, venipuncture for both catheters and blood collection, and rectal palpation and vaginal exams. Until recently, many in the zoo community were skeptical of the ability to provide comprehensive medical care for elephants functioning in a positive reinforcement based system where compliance in behaviors is voluntary. That skepticism is eroding away as more examples of successful medical treatment under these conditions are being produced. The following examples illustrate the advances being made in the management of elephants in protected contact.

The Houston Zoo manages Asian elephants in a protected contact system. Thailand, the 34 year, old bull, has had chronic nail cracks and abscesses in his front feet for 15 years. Prior to protected contact, Thai was maintained in a no contact system, which meant routine foot care was not possible. With the introduction of protected contact and positive reinforcement techniques, Thai was easily trained to present his feet through an opening in the training wall. Over the past six years, Thai has tolerated routine trimming as well as deep trimming into the abscessed areas. He has also complied in daily treatment of the abscesses and regular foot soaks in either Epsom salts or Nolvasan and warm water once or twice daily.

With expanded access to Thai and his cooperation, diagnostic techniques were now possible. Radiographs were taken to determine the depth of the infected tissues and to see if there was any bony involvement. Radio-opaque dye was injected into the hole so that the tract could more easily be identified. Thai was trained for the procedure by first teaching him to extend a front leg through the foot hole and place his foot on a custom

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built footrest. Next an old radiograph cassette was used to train him to hold steady with the plate in a variety of positions under and around his foot. The final step was to move the large machine in position for the procedure while he placed and held his foot in the proper positions.

Currently, Thai's feet are greatly improved. Granulation beds have formed where the abscesses were and only small holes are visible on each foot. Thai's feet will always be of concern, but through training, the keepers and veterinarians maintain the ability to monitor and treat his condition as necessary.

Another case, Kiba, was born at the zoo in 1987, with an umbilical stump that was excessively long and soon became infected. Although it was treated daily with Betaine, the infection persisted and a cantaloupe-sized bulge remained present on Kiba's abdomen. In February 1992, prior to the initiation of protected contact, Kiba had to be sedated for an ultrasound exam to check the integrity of the abdominal wall and for the potential for entrapment of intestinal loops. The exam showed the area to have healed well. In November 1995, Kiba's umbilical area appeared very swollen. The immediate concern was that a loop of bowel had become trapped in a previously undetected defect. An ultrasound exam was needed again, but this time, the elephant staff had the opportunity to train Kiba for this procedure. Kiba was taught to present his body parallel to the training wall. He was then desensitized to components of the ultrasound exam including: palpating the area, the close proximity of the equipment, the feeling of the contact gel and pressure of the transducer, and unfamiliar people working in close proximity to him.

Kiba was an extremely responsive elephant and was ready for the exam within days. Fortunately, no loops of bowel or defects were detected; the swelling was likely due to mild trauma. The swelling decreased within two weeks and never reoccurred.

MEDICAL TRAINING AND THE HUMAN-ANIMAL BOND

The final case study involves a female California sea lion, and demonstrates the benefit of the bond formed between trainer and animal as a result of positive reinforcement training. In November 1994, trainers noticed that Gertie, a California sea lion's lower left teeth were loose and she had ulcerated areas around her gums and lower pallet. By December, she was sedated to remove the loose teeth, but within a month the right teeth were also loose and the ulcerations continued to appear. Another sedation to examine the jaw integrity revealed basal squamous cell carcinoma throughout the lower jaw. The rapidly progressing cancer had to be removed and the only option was to remove affected portions of the jaw.

The prognosis for such a radical surgical procedure was not favorable, but Gertie came through the procedure better than expected. For the week following the surgery, she was completely lethargic, not eating and in an overall depressed condition. The decision to euthanize her was made as her condition appeared to worsen and recovery seemed unlikely. But as a last chance for Gertie, a trainer with a long history of training various husbandry and exercise behaviors with Gertie was brought in to work with her. Almost immediately, Gertie responded to the trainer and was eating within days. Her diverse

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behavioral repertoire offered many options to monitor the healing progress as well as help her re-learn to eat. Gertie was trained for a full mouth exam, allowing all teeth and areas of her mouth to be touched and manipulated. This behavior proved instrumental in recovery. As the areas began to heal, suture material had to be trimmed away as it worked out of the tissue. This involved Gertie holding her mouth open and allowing scissors around the surgery site. She also required topical treatment and cleaning of the site, which she tolerated remarkably well.

Gertie's recovery took over three months. During this time, she was housed alone at the animal hospital. Her psychological well being and her physical needs were addressed through regular enrichment and training. Her enclosure was relatively small, so to provide for exercise needs, she was walked several times during the day, which provided the opportunity for enrichment. Her full recovery was largely due to the training that had occurred in the years before the surgery, and the trust between animal and trainer that is an inherent and powerful part of positive reinforcement training.

THE VERSATILITY OF HUSBANDRY TRAINING

As husbandry training grows in the zoological community, many applications and benefits not initially perceived continue to emerge. Some examples of novel application of husbandry training include:

- Getting saliva samples on cotton balls from gorillas
- Training free ranging hoof stock to accept yearly vaccinations
- Milking a rhinoceros for supplementing a hand raised offspring
- Performing a vaginal swab on a female warthog
- Training female drill baboons for tube insertion for assisted reproduction
- Blood collection on rhinos, tapir, and adult chimpanzees
- Weighing rhinos, pygmy hippos, giant anteaters, and tapirs
- Trimming grizzly bear nails

CONCLUSIONS

In conclusion, positive reinforcement training is gaining stature among animal managers and veterinarians as a useful tool for enhancing animal health and husbandry. The applied use of positive reinforcement techniques provides the means to pro-actively address a wide range of medical conditions and to develop and implement an effective program of preventative medicine. These benefits make training a valuable part of any animal management program and have significant implications for overall animal care and welfare.