

A BEHAVIORAL MANAGEMENT APPROACH TO CARING FOR GREAT APES

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INTRODUCTION

The captive animal management profession has experienced two revolutions of sorts in the last decade. The first was the recognition of enrichment as an important and necessary component of captive animal care and welfare. This was chiefly fueled by a growing awareness of the need to provide behavioral opportunities for primates, as well as the Animal Welfare Act of 1987, which mandated that the psychological well-being of primates be adequately addressed. In the 13 years since, enrichment has become a mainstay of great ape management and is no longer considered an “extra” responsibility of animal care, but a necessary component. Enrichment has been a popular topic at many conferences, and even has a dedicated publication with *The Shape of Enrichment*, as well as regular columns in professional publications such as IMATA’s *Soundings* and AAZK’s *Animal Forum*. These resources offer a variety of references of enrichment ideas for those interested in expanding their repertoire of enrichment activities. The AZA took a very big step in the past year by tasking their Behavior and Husbandry Advisory Group with developing criteria for evaluating and incorporating enrichment into AZA accreditation. This clearly demonstrates the professional community’s on-going commitment to enrichment.

The second revolution was the recognition of positive reinforcement training as a valuable tool to enhance the care and welfare of captive animals. There is an ever-growing number of papers, conference presentations, and articles on the application of training techniques to address an array of issues that impact the care and management of great apes and nearly all other species (Bloomsmith et al 1994, Laule et al 1992, Laule 1995, Reichard 1992, Reinhardt 1992). Most professionals recognize the benefits of properly applied positive reinforcement techniques to achieving cooperation by animals in routine husbandry activities, veterinary procedures, research protocols, reproductive procedures, and transports while enhancing keeper and handler safety (Klein 1999, Segerson 1995, Loehe 1995). These activities are accomplished quickly and reliably while simultaneously reducing the associated stress and anxiety levels for both the human and non-human participants. Another definitive sign of acceptance is the growing number of animal behavior positions being created in zoos to oversee both training and enrichment activities.

THE NEXT STEP

It has been our experience, and we believe experts would agree, that great apes are highly sentient, responsive animals with complex social and behavioral needs. To manage them adequately is requiring increasingly sophisticated enrichment techniques. Furthermore, positive reinforcement training with great apes has produced a growing list of successful applications to specific problems and husbandry objectives. Because of the nature of great apes, and the need to continue to find ways to enhance their care and welfare, we would like to suggest a next step in the process. We believe it is time to integrate the use of training and enrichment techniques into

a comprehensive, systematic approach to great ape management we call behavioral management. The premise is simple—training and enrichment are complementary processes whose individual strengths are greatly enhanced by integrating them into one comprehensive system. Enrichment, like training, is most effective if it has a specific purpose, and triggers real results. In a systems approach to animal management, both training and enrichment are used flexibly and purposefully to implement husbandry routines, address behavioral problems, plan operational protocols, and develop strategies to enhance care and welfare.

In a behavioral management system, all animal care staff are trained in the basics of operant conditioning techniques. Although it may not be feasible to develop equal training skills in all personnel, everyone who works with the animals should be capable of using and maintaining trained behavior once it is complete. They should also be capable of implementing simple training protocols, and incorporating reinforcement into interactions with animals when they cooperate with husbandry and medical procedures. With this approach, training is not just something that is done in a training session, but a methodology that is incorporated into the daily routine.

In a behavioral management system, animals are provided the opportunity and motivation to voluntarily cooperate in activities and procedures. Keepers and caregivers provide clear cues for desired responses, and reinforce those responses when they occur. To increase successful outcomes, animals are given a reasonable opportunity to cooperate in the desired behavior. In other words, we exercise patience and exhaust the positive alternatives before any kind of negative reinforcement technique is used. In order to be proactive, staff plan ahead and actively prepare animals for veterinary procedures, research protocols, or any foreseen changes in the routine such as altering social groups or environmental factors. Finally, problem-solving is an integral component of behavioral management, a formal process based on the scientific method. Staff assess the problem behavior, make an educated guess as to why it is happening, and initiate strategies to address the underlying causes. Then, results are measured, and if necessary, new strategies implemented, until the problem is adequately addressed.

Behavioral management is not a new idea. Models for this approach exist in marine mammal and elephant management systems that have been around for decades. For example, using positive reinforcement training to teach dolphins and sea lions to do an array of entertaining show behaviors led to the use of training to gain those same animals’ voluntary cooperation in a number of veterinary procedures including, drawing blood, collecting fecal, urine, and stomach content samples, ultrasonography exams, lancing and cleaning of abscesses, and so on. The need to work multiple animals for show purposes led to the discovery that operant conditioning techniques, carefully applied, helped mitigate the negative consequences of dominance. Cooperation and positive social interactions could be increased and aggression decreased by training for these outcomes. Neurotic behaviors, such as biting, frequent regurgita-

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tion, and swallowing foreign objects were handled from a behavioral perspective with encouraging results. Over time, what evolved was the integration of positive reinforcement training techniques into a practical and comprehensive approach to animal care and management. Eventually enrichment was incorporated into the process as a significant element as well.

The same systematic approach to the use of training is evident in elephant management programs. Protected contact (PC) was specifically designed as a comprehensive system for managing elephants. Based on the same positive reinforcement techniques we used with marine mammals, a PC system uses those techniques to gain the voluntary cooperation of the elephants in daily husbandry behaviors, veterinary procedures, enhancement of social management, movement of elephants on and off exhibit, and to access, restrain, and transport them (Abadie 1997, Gibson 1998). Since PC is a relatively new system, presented to the zoo world in 1991, from the beginning it was to incorporate enrichment techniques into elephant management to enhance animal well-being.

In a behavioral management system, actively assessing and addressing behavioral problems is an integral part of the management strategy. This stems from a recognition of the power and limitations of operant conditioning. It also comes from a recognition that we are training our animals all the time, and they are continually training us. Every time we place food in a holding area, open the door, and the animal enters to eat, training has occurred while achieving the desired result. And every time they step in the doorway, sit down, hold the door, and refuse to move another step, training has occurred without the desired result. This is a simple form of training, but training nonetheless. In fact, it is the simplicity, and lack of formality, that can be a problem. For in this context, those times when the chimpanzee or orangutan does not walk through that door, there exists no series of learning steps to retrace enabling effective resolution of the problem.

Our point is that operant conditioning through positive reinforcement is a powerful, versatile, user-friendly tool that offers tremendous benefits to those who have the opportunity to experience it to its full potential. It allows us not only to train behavior, but it provides a means to better assess the social and environmental factors which influence behavior. Furthermore, the combined power of training and enrichment provide the means to address behavioral, social, psychological, and physical needs of animals under human care. Great apes, we believe, would benefit from such a comprehensive and systematic approach to their management.

ONE MODEL PROGRAM

One program that we feel has made a significant attempt to develop a comprehensive behavioral management approach to the care of great apes, is the program currently being conducted at the M.D. Anderson Cancer Center Science Park chimpanzee breeding facility in Bastrop, Texas. One of the most distinguishing aspects of this program is its longevity. In 1986, Director Dr. Michale Keeling demonstrated his dedication to improving the well-being of the animals at the facility by hiring Dr. Mollie Bloomsmith to formalize the enrichment program. An objective from the onset of this program was to document and evaluate the efficacy of behavioral activities, which at this early stage was the enrichment component. In 1997, a dedicated position of "enrichment technician" was created, and continues to this day. In January, 1991, the next step towards a comprehensive approach to managing behavior was taken by creating an on-site dedicated "trainer position" and Active Environments (AE) began a long-term consulting relationship to assist the

trainer in developing, implementing, and overseeing the training program. The original five-year program was funded by a grant from NIH and support continues to this day. The purpose of the program is to enhance the effectiveness of behavioral, husbandry, health care, investigative, and environmental enrichment programs by integrating the use of positive reinforcement techniques into the management of the colony of approximately 150 chimpanzees.

To initiate the program, a training committee was formed consisting of the chimpanzee colony supervisor, veterinarians, research director, trainer, AE consultant, Gail Laule, and Dr. Keeling. This committee prioritized behavioral goals, occasionally recommended specific animals to train, discussed various problems encountered, and insured that resources were available to implement the training. In selecting and prioritizing specific projects for the chimpanzee training program, seven primary objectives were identified that should address:

1. Voluntary movement of animals between cages and outdoor areas
2. Entering and exiting transport and/or restraint cages
3. Voluntary cooperation in veterinary and research procedures
4. Integration of animals into social groups
5. Development of maternal skills and normal development of young
6. Training as enrichment
7. Enhancing the development of a more complex and physically challenging environment

Getting such a big program off the ground was the challenge and opportunity of a lifetime. Bob Thurston, the dedicated trainer, had worked at the facility for 8 years as a care giver and technician, so he had good practical experience with chimpanzees and first-hand knowledge of individual animals. He needed to learn the principles and techniques of positive reinforcement training. Teaching a new trainer how to train, at the same time you are teaching chimpanzees how to be trained, can be a chaotic experience. Consequently, Bob learned the hard way.

The initial behavioral goals were quite basic: teach the animals what a conditioned reinforcer is, and train simple behaviors like station, touch a target, sit, stand, and present a body part. Other goals were a bit loftier: document as many aspects of training as possible by using multiple record-keeping forms noting behaviors worked in each session, length of time spent on individual behaviors, assessing percentages of progress, and attempting to determine when a behavior was "complete." We expected some initial resistance to the new training. Chimpanzees, like people, are wary of change. However, we were not prepared for the level of resistance we experienced. Two of our three carefully chosen animals, with priority needs, went through an extended period of almost total non-compliance. By the end of the first month skeptics were nodding their heads knowingly and Bob was considering an extended stress leave. This, unfortunately, was his difficult and frustrating initiation into the world of positive reinforcement training.

The one bright and totally surprising spot in this difficult period was the third animal, Joey. As it turned out, Joey did more to convince the skeptics than any other single event in the 10 year history of the program. Joey was a former pet who had proven quite convincingly that he was an infinitely better trainer than any human at the facility. Joey did what Joey wanted to do, when and if he want-

ed to do it. A daily ordeal occurred over cleaning his home, which consisted of indoor and outdoor enclosures. Although Joey had been socially housed, he was housed alone at this time due to difficulties his non-compliant behavior had caused. It was not possible to ensure reliable access to him, his group members, or his enclosure, so the decision was made to house him alone so that other chimpanzees would not be at risk of less than optimal care. He had neighbors on one side in visual and tactile contact. If Joey wanted his area cleaned, which was roughly every 2-3 days, he would move to one enclosure and then the other with ease. However, if he chose not to shift for cleaning that day, he was virtually impossible to move. At one time or another nearly every form of positive and aversive reinforcement and punishment was tried on Joey, with no success. Eventually, the care giver staff literally gave up, and would simply clean the enclosures on his schedule. So, when we took on Joey, with the goal of teaching him to shift reliably every day, eyes rolled. Yet, to our relief, and others' surprise, Joey responded willingly and enthusiastically to the training from the first day.

To understand why a formerly "impossible" animal would suddenly become the epitome of cooperation is to fathom the power of well implemented positive reinforcement training. It's about using a mutually beneficial process to achieve mutually beneficial results. This training is about giving the animal something they want in exchange for something you want. Since we are referring to more than just food reinforcers, you have to know what the animal wants, in order to give it to them. That means knowing your animals, their preferences, and idiosyncracies. Training is also about giving back some choice and control to the animal, certainly something coveted by all great apes. It's about using the techniques available, like desensitization and cooperative feeding, to make tough choices easier for animals. Great apes will choose to voluntarily cooperate in the most invasive procedures, like blood draws, if good, sound desensitization has been effectively applied, and thus the fearfulness of the procedure sufficiently diminished. They will curb their aggression towards another conspecific, if techniques like cooperative feeding have been consistently applied, making it worth their while to socialize in an affiliative manner.

For Joey, recognizing what had value to him was critical. Training opened the doors to opportunities for attention from humans, something he greatly desired. And of course, the more he cooperated, the more people wanted to give him attention. He began to shift reliably, learn complete body exam behaviors, including the stethoscope, optical equipment, and even rectal thermometer (which happens to be his favorite). He was one of the first animals to voluntarily cooperate in blood draw and has remained reliable for monthly blood samples. He even participated in a study where blood was drawn 14 times during a 24-hour period. He is now managed and lives harmoniously with another male chimpanzee, urinates on command into a cup, and knows a variety of enrichment behaviors. To us, he has become the "poster chimpanzee" for the training revolution. And, it was a program like this that made the chimpanzee Joey is today possible.

The good news is that over time the other two animals' resistance diminished, and good progress was made. As more animals entered the program, we learned more effective ways of working through this initial period of adjustment, and gaining the animal's cooperation. The accomplishments have continued to grow.

Since allocation of staff time is critical, and there is endless work to be done, objectives are carefully assessed before embarking on any training project. Because urine collections are a part of life at Bastrop, all females are slated for urine collection training. The first subject was a young diabetic chimpanzee who needed close and

frequent monitoring of her glucose levels. Urine collection training allowed regular collection, by multiple staff members, on a 24-hour basis. For a few years urine was routinely collected two to four times per day, but has been collected as many as 14 times in one day. She normally urinates in less than one minute.

This same animal was also the first to be trained to allow voluntary blood sampling to further aid in monitoring her diabetes. Since then three other animals, all adult male chimpanzees, have been trained to allow blood sampling. Two have medical conditions that require monthly blood collection, so training has made collection easy and eliminated the need to anesthetize the animal in the process. These two chimpanzees have been reliably cooperating in blood draws for 8 years.

Training the chimpanzees to voluntarily present an arm or leg for injection has always been one of the top priorities and a behavior slated for the entire colony to learn. Support from the veterinarians and veterinary technician has contributed to the success of this training. A big part of desensitizing animals to invasive procedures is to desensitize them to the person who actually does the procedure.

As of this writing, the following numbers show the status of trained behaviors reported by Jaine Perlman, current program trainer. In order to be classified as "trained", the animal must demonstrate a near perfect level of compliance; many of the "well into training" behaviors are very near completion; the "not trained" category indicates the percentage of animals for which the behavior has not been initiated.

Present for injection:

- 64% trained
- 34% well into training
- 2% not trained

Urine collection—female population:

- 20% trained
- 61% well into training
- 19% not trained

Body exam behaviors:

- 49% trained
- 50% well into training
- 1% not trained—animals know most behaviors but do not know one of the behaviors reliably

Rolling transport cage:

- 71% trained
- 2% in training
- 27% not trained

Staff training is an integral part of a behavioral management program, and proved to be a challenge to this program. New training of behavior is the responsibility of the trainer, but as behavior is completed it is necessary to transfer that behavior to other staff members. Behaviors like cooperative feeding, urine collection, moving animals in a rolling transport cage, and shifting animals for cleaning twice a day, have required the cooperation of all care givers. Furthermore, since the purpose of the program has always been to integrate the use of positive reinforcement techniques into the daily operations of the colony, ultimately all staff must be capable of applying the fundamentals to a variety of husbandry and handling tasks.

Staff training has been implemented in several ways. When possible, written protocols have been developed for a newly trained

behavior that is being transferred from the trainer to other staff. Specific care givers have been assigned specific tasks, and those individuals get special instruction and assistance from the trainer. One training project was initiated directly with the care givers, in order to improve shifting behavior of chimpanzees in two sets of buildings, and to introduce the use of positive reinforcement to the staff. The staff began by completing a care giver poll in which they rated each of the animals on cooperation prior to the project. Then a protocol was developed and reviewed with the care givers which included consistently reinforcing animals after they respond to the command to shift. Later on, care givers were asked to differentially reinforce the shifting behavior, that is, give bigger rewards to animals who demonstrated a quick and cooperative response, and less to those who were resistant and slow to respond. Periodic re-rating of the animals is used to see if cooperation is improving. According to the polls and feedback from staff, cooperation has improved overall.

An important part of the program has been to design apparatus necessary to support training activities. Of particular note is our design for a great ape blood sleeve used with the males, and high tech "pee wand" for urine collection of females.

Investigating and documenting aspects of training has always been a primary goal of the program. Besides daily record keeping, written protocols or step-by-step guides for training each behavior have been developed. All this information is available to interested facilities. In fact, transfer of information to other facilities has been a stated goal of the program from the beginning. Under the guidance of Dr. Bloomsmith, several significant studies have come from the program, including the use of training to reduce aggression, measuring the enrichment value of training, and comparing the benefits of informal human/animal interaction to formal training interaction. Papers have been published on training animals for urine collection, blood draw, voluntary movement, and the numerous benefits of training animals for a variety of husbandry and research procedures.

A significant outcome of this program was the development of the Primate Training and Enrichment Workshop. This highly successful workshop has now been offered 6 times, with 30 participants each time. Participants have included professionals from both the biomedical and zoo communities, as well as rescue facilities and those involved in in situ projects.

CONCLUSION

Enrichment and training to enhance animal care have been realized as methods to vastly improve the well-being of captive apes. Recognizing their efficacy, the next step is to merge the two in the development of comprehensive behavioral management. The profession is on the cusp of this type management, as many facilities are moving in this direction. By combining these elements, along with facility design and operational procedures, a behavioral management system can be realized that is far more versatile, effective, and responsive than any single component.

Over the past 10 years, the program at M.D. Anderson Cancer Center has successfully met behavioral management goals and care-

fully addressed facility and operational concerns. The longstanding success of this 10 year program validates the need to implement comprehensive behavioral management systems. The program developed at M.D. Anderson Cancer Center, under the direction and vision of Dr. Keeling, is a good model on which other research centers, laboratories, and zoological parks may base their individual program development. Our goal is to continue to improve captive ape's well-being, which has been described as the ability to respond and adjust to changing situations (Novak and Suomi 1991). M.D. Anderson's program gives evidence that there does not exist a more effective, flexible, and suitable means to achieve this goal than comprehensive behavioral management.

References

- Abadie, Margaret 1997. Medical management of an Asian elephant herd in a protected contact system. In: *AZA Annual Conference Proceedings*.
- Bloomsmith, M.; Laule, G.; Thurston, R.; Alford, P. 1994. Using training to modify chimpanzee aggression during feeding. In: *Zoo Biology*, vol. 13, pp. 557 - 566.
- Gibson, K. 1998. International shipment of an Asian bull elephant using protected contact management. In: *Journal of Elephant Managers Association*, vol. 9, number 1.
- Klein, Lynn M. 1999. Reshaping tractability of an aggressive male sea lion. Presented at IMATA Annual Conference, Chicago, IL.
- Laule, G., Keeling, M.; Alford, P.; Thurston, R.; Bloomsmith, M.; Beck, T 1992. Positive reinforcement techniques and chimpanzees: An innovative training program. In: *AAZPA Regional Conference Proceedings*.
- Laule, Gail 1995. Use of positive reinforcement techniques in primates to enhance animal care, research, and enrichment. In: *Wildlife Mammals as Research Models: in the Laboratory and Field*. Eds. K. Baynd and Michael Kreger. SCAW, Greenbelt, MD.
- Loeche, Rebecca 1995. Benefits of a positive reinforcement training program with bonobos, *Pan paniscus*. In: *AZA Regional Conference Proceedings*.
- Novak and Suomi 1991. In: *Through the Looking Glass: Issues of Psychological Well-Being in Captive Nonhuman Primates*. American Psychological Association. Washington, D.C.
- Reichard, T.; Shellabarger, W. 1992. Training for husbandry and medical procedures. In: *AAZPA/CAZPA Annual Conference Proceedings*.
- Reinhardt, V. 1992. Improved handling of experimental rhesus monkeys. In: *The Inevitable Bond: Examining Scientist-Animal Interactions*. Eds. H. Davis and A. Balfour, 171-177. Cambridge: Cambridge University Press.
- Segerson, Lucy; Laule, Gail 1995. Initiating a training program with gorillas at the North Carolina Zoological Park. In: *AAZK Proceedings*.