

Protocol for Training Select Individuals from a Large Group of Socially Housed Anubis Baboons

Rebecca Bearman, Msc
Avian Trainer, Natural Encounters, Inc.

Introduction

Animal welfare has been a hot topic for as long as animals have been under human care. In 1900, the Cruelty to Wild Animals Act outlawed tormenting zoo animals, shortly before Carl Hagenbeck chose positive reinforcement training (PRT) over traditional training methods to manage his animal collection (Mench and Kreger, 1997). Today, we know PRT is a successful tool for improving the welfare of animals in captivity.

PRT provides tools to: improve husbandry through cooperation between keeper and animal; improve social management through increased affiliation and decreased aggression (Prescott and Buchanan-Smith, 2003); increase overall activity (Waite, Buchanan-Smith & Morris, 2002); desensitize animals to potentially stressful environmental factors; and increase accessibility (Laule and Whittaker, 2007).

PRT has been shown to decrease stress (Basset, Buchanan-Smith, McKinley, *et al.*, 2003) and stereotypical behaviors (Bloomsmith, Marr & Maple, 2007), while increasing communication and trust between caretakers and animals, enhancing overall well-being of captive animals, and assisting in husbandry, veterinary, and research procedures (Lambeth, Hau, Perlman, *et al.*, 2006). According to Lambeth *et al* (2006), staff also benefit from decreased stress as animals learn to cooperate. PRT training sessions allow zoo goers to see animals up close, performing natural behaviors on cue; ask questions after training sessions; and enjoy increased learning opportunities (Anderson, Kelling, Pressley-Keough, *et al.*, 2003).

Although benefits of PRT have been clearly demonstrated, there are circumstances in which caregivers choose not to employ it. Training animals in groups can lead to aggression between cage mates; or less dominant animals may refuse food from a trainer in the presence of a more dominant animal (personal observation). To eliminate the need to separate animals for training, this study addressed methods for training select individuals housed within large social groups. Through trial and error, an effective protocol for training individual animals within a larger group was developed.

Methods

Location and Study Animals

The 49.56.20 Anubis baboons (*Papio anubis*) involved in this study were housed in a two-acre enclosure at Six Flags Wild Safari in Jackson, New Jersey, USA. All males, with one exception, were castrated. While Wild Safari is a drive-through park, the baboon habitat is closed off from the road. Six males were initially selected to participate in the study over seven days of *ad libitum* observations of the entire group (Altmann, 1974); an additional individual that regularly approached during training sessions was added (see Training Methods).

The training area was along the exterior fence in an employee-only area. Participant baboons were selected based on perceived dominance level (mid- to high-ranking), curiosity (high), fearfulness (low) and desire for reinforcement (high) (Mellen and Ellis, 1997; Savastano, Hanson & McCann, 2003; Laule and Whittaker, 2007). These criteria suggest that an animal will be interested and successful in a PRT program (Bloomsmith, Marr & Maple, 1998; McKinnley, 2003).

Training Methods

Via protective contact through a chain-link fence, 123 training sessions were conducted over 51 days, each averaging 4.8 minutes in duration. Animals were trained during normally high activity periods to increase likelihood of success (Ramirez, 1999). Two to four individuals were trained per session, during two training sessions per day. A variable training schedule was introduced to avoid session anticipation, a potential cause of frustration, which might have led to aggression (Ramirez, 1999). The trainer chose a focal animal at the start of each session based on which animals showed up and had not been trained in previous sessions. Systematic rotation was not used because not every focal animal was present at every session. Initially, sessions were kept to approximately five minutes, due to increased aggression observed during longer sessions; duration increased slowly over five weeks, up to 15 minutes per session without any contact aggression. The focal animal was reinforced for the chosen behavior by the lead trainer, while other nearby animals were fed by training assistants, and reinforced for non-interference with the focal animal and trainer.

Table 1. Behaviors trained to some or all of six focal monkeys.

Behaviors trained	Definition
Bridge recognition	Recognition that trainer's whistle indicated delivery of primary reinforcement.
Manners	More dominant monkeys allowing less dominant, nearby conspecifics to accept food from trainers without aggression.
Point-follow	Trainer points the index finger at an individual, along with brief eye contact, followed by trainer walking toward a destination along the fence line with continued point toward monkey. Behavior criterion is monkey following trainer until bridge is sounded.
Target touch	Touching target upon presentation.
Target station	Remain in front of target, no contact with target required, for duration of session.
Target hold (verbal S ^d = "hold it")	Grasping target with fingers until bridged.
Target discrimination	Touching only designated target and not touching another monkey's target.
Recall to target	Moving toward designated target upon presentation.

Step 1. Approaching the Trainer

Initially, focal animals were reinforced for approaching the trainer with a regular keeper present, then reinforced for approaching the trainer without the regular keeper present. Once a relationship was established, a focal baboon was selected for each session. The trainer worked with the focal while assistant trainers reinforced surrounding animals for allowing the focal to receive reinforcement (Schapiro, Bloomsmith & Laule, 2003; Laule, Thurston, Alford, *et al.*, 1996). Initially, more dominant animals were reinforced before subordinate animals (Schapiro, Bloomsmith & Laule, 2003) or at the same time. Once dominant animals allowed subordinate individuals to receive food, this policy was no longer strictly followed. During the project, one monkey, Face, was incorporated into the program after consistently interfering, and was trained to allow subordinate monkeys to receive food in his presence.

Step 2. Visual Recall and Station on Individual Target

Each animal was assigned a visual symbol to act as a target, recall, and station. As an individual approached, his unique target was held to the fence and the animal was reinforced for touching it (initially) and maintaining contact until bridged (as training progressed). Once this behavior was reliable, the animal's knowledge of his own target was tested by presenting him with both the correct target and an incorrect one, and reinforced for touching the correct target.



If an individual recalled to his correct target, he was reinforced and all other animals that approached were ignored by the lead trainer. Non-focal animals were reinforced by assistant trainers or lead trainer on a variable ratio reinforcement schedule (Mellen and Ellis, 1997) for allowing the focal animal to participate uninterrupted.

Record Keeping and Creating the SOP

Every training session was video recorded (Panasonic, SDR-S7) to keep accurate and reliable records on the duration of training sessions and how many sessions were needed for individuals to progress to the next step (Ramirez, 1999). A standard operating procedure (SOP) for training individuals in a large captive group was created using collected data.

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Photo 1: Brow extending his duration of "Target Hold" behavior while Finger stations on his target nearby and is reinforced by assistant trainers. Other animals have learned to stay a slight distance away and are also reinforced for maintaining that distance.

Results and Discussion

Behaviors Trained

Table 2. Number of sessions and total training time devoted to each focal animal.

Focal	Sessions	Total Time (min)	Average Time per Session (min)
Finger	21	78	4
Bigman	16	57	3.5
Brow	23	72	3
Mouth	12	34	3
Throat	11	21.5	2
Face	10	46.5	5
Avg	15.5	51.5	3.4

Table 3. Total time required for each individual to learn behaviors and average time required for all individuals to learn behaviors.

	Manners		Point-Follow		Target touch		Target hold up to 3 seconds		Target Hold on Sd "Hold It"	
	# of sessions	total time (min)	# of sessions	total time (min)	# of sessions	total time (min)	# of sessions	total time (min)	# of sessions	total time (min)
Finger	4	19.5	2	4.5	3	8	1	3	-	-
Bigman	-	-	1	5	1	3	1	3.5	2	6
Brow	-	-	2	5	5	10	1	4	-	-
Mouth	-	-	4	8	5	13.5	-	-	-	-
Throat	-	-	1	1	-	-	-	-	-	-
Face	3	17	-	-	6	25	-	-	-	-
Avg	3.5	18.25	2	4.7	4	11.9	1	3.5	2	6

Reinforcement Methods

High value foods (peanuts, dried fruits) were used during early training sessions, given only to the most dominant animals for allowing conspecifics to receive food. Very high value foods (berries, pretzels, marshmallows) seemed to motivate dominant animals to become aggressive toward conspecifics, prompting food stealing, so the use of these reinforcers was eliminated early on. Carrots and sweet potatoes were the most common primary

reinforcement, as animals were willing to work for them, but were not as focused on other animals also receiving them.

Trainers

The study results indicate that training select individuals within a large social group is achievable with minimal staff time. Trainers had no prior relationship with animals in the group, which did not impact success (contrary to findings of Broder, 2008). The lead trainer was an experienced primate trainer, while assistant trainers had working knowledge of training theories, but no experience training zoo animals. Once a few baboons learned their target, only one trainer was needed per session, even with as many as 20 animals approaching the training area (see photo 2). It is hoped that keepers with little training experience can be successful using the protocol created.



Photo 2: A single trainer conducting a training session with multiple monkeys.

Using Positive Reinforcement to Decrease Aggression During Sessions

An initial concern was aggression stemming from food competition among animals being trained, and steps outlined in the previous section were taken to minimize this. Animals that exhibited incorrect behaviors were given an LRS (Least Reinforcing Scenario), lasting about 3 seconds, then the trainer continued the session. LRS included the whistle dropping from the mouth and removal of eye contact

with no other change in body posture or position of trainer. The short LRS prevented monkeys from providing several incorrect, non-reinforced behaviors in a row, decreasing the likelihood of frustration. Initially, monkeys would leave during the LRS and attempt to solicit food from other trainers. The trainer using an LRS would announce it so other trainers would not accidentally reinforce the focal receiving an LRS. When the focal received no food from assistant trainers, he/she would return to the lead trainer, where training resumed following an additional three-second LRS.

LRS was also utilized for any aggression during sessions. Sessions were only terminated if contact aggression was observed, or non-contact aggressive occurrences lasted more than two minutes without pause. Due to the high frequency of aggressive interactions within this troop, it was decided that terminating sessions following all aggressive incidences would be detrimental to the program (unlike McKinnley, Buchanan-Smith & Morris, 2003). Aggression toward juvenile animals that was perceived as discipline was followed by an LRS; then the session continued, concluding only if an escalation of discipline toward juveniles was observed.

The male that appeared most dominant was not trained to target first (unlike in Shaprio, Bloomsmith, & Laule, 2003), as this may not always be an option if an animal lower in the hierarchy is in need of immediate husbandry training. The dominant male was trained during randomly scheduled sessions while other males were also trained.

Voluntary Participation and Maintenance of Behaviors across Training Sessions

The study relied on animals choosing to participate. There was one occasion when a focal (Big) animal that had already been trained to target, recall to target, point-follow and hold on target failed to appear for training for 10 consecutive days. Upon returning, he was observed to have an injury possibly caused by a conspecific, and he refused to participate or approach the trainer. Initial concern was that social issues within the group had affected his training and that he would no longer be a training candidate. After watching a session from about 100 feet away on the eleventh day, Big chose to continue participating on day 12 and recalled all his prior training. Although this monkey chose not to participate at certain times, this had no detrimental effect on his overall training. His choice to resume training shortly after his disappearance and apparent displacement within the hierarchy suggests that training sessions are reinforcing for participants (Maple, 2007), and that even animals not at the top of the hierarchy will choose to participate without the need for separation from the group.

Fearful Animals

The presence of a more dominant individual resulted in inhibited responses by some lower-ranking monkeys. Baboons were trained to follow the trainer away from dominant conspecifics, which decreased inhibition. Animals seen to reject reinforcement were never offered food if they were in close proximity to more dominant monkeys. Over time, training has been shown to increase affiliative behavior (Laule and Whittaker, 2007) and reduce the need to move less dominant animals away from more dominant animals.

Within the focal group, three animals showed intense fear of the target upon initial presentation; two of those monkeys overcame their fear through very slow successive approximations over the course of the study. The third monkey was readily taking food off the target by the end and it is believed that within another week or two, he would have been touching the target. Over time, training has been shown to reduce fear levels in primates (Basset, Buchanan-Smith, McKinley, *et. al.*, 2003).

Conclusions

Based on the results from the training procedures employed, the following conclusions may be drawn:

1. Individuals within a large social group can be trained to participate in husbandry related behaviors without removal from the group and without training dominant animals first.
2. Training procedures which are sensitive to dominance relationships and aggression levels can reduce agonistic interactions during training sessions.
3. Minimal staff time is required for these training sessions, averaging 4.8 minutes per session and occurring no more than twice per day for each animal.
4. Initiating a training program can increase veterinary care for otherwise hard to separate animals.

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