

**BEHAVIORAL TRAINING OF
1.1 BLACK RHINOCEROS (*Diceros bicornis*)**

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In January 1994, a behavioral training program was implemented with Zoo Atlanta's 1.1 black rhinoceros (*Diceros bicornis*). This paper will describe the reasons for beginning this program, the methods used, progress made thus far and future goals.

Zoo Atlanta currently houses two black rhinos. Bo is a 9-year-old male captive-born in Czechoslovakia, and Rosie is a 5-year-old female born at the San Francisco Zoo. The rhinos are currently housed separately, but are able to interact with one another through vertical bars and gates. In the near future, we plan to introduce these animals for breeding per the recommendation of the Black Rhinoceros SSP.

The rhino exhibit is very popular with our zoo visitors. Unfortunately, the lack of consistency with which the animals shift on and off exhibit resulted in there frequently being no rhino visible to the public. This fact, along with the amount of keeper time being spent on shifting attempts, led us to seek a solution.

A proposal was drawn up recommending and describing a behavioral training program for working with the rhinos. The program was designed to work towards four initial goals:

1. Improving the consistency and success rate of shifting.
2. Training husbandry behaviors to facilitate veterinary care.
3. Increasing tractability to take advantage of research opportunities.
4. Increasing behavioral control to assist with the introduction process and reproductive management.

Initially the primary focus was to increase the consistency and success rate with which the rhinos shifted on and off exhibit. We began by looking at how keepers had responded when the rhinos refused to shift. Through observations, talking with keepers and reading previous daily reports, it became evident that the rhinos had a history of being reinforced for inappropriate behavior. When the animals refused to shift, they received a great deal of time and attention as keepers tried repeatedly to get them to cooperate. When they shifted correctly, however, the rhinos received little additional interaction.

While this pattern was undoubtedly part of the problem, other factors also contributed. In cold or wet weather, the rhinos show a strong inclination to stay in their warm, dry holding area. Sudden, loud or unusual noises also negatively affect the rhinos, shifting behavior, and tend to have a long-lasting impact. And during periods when Rosie appears to be in estrus, both rhinos are much less cooperative.

In order to monitor the rhinos, progress during the training program, we developed shifting records to document not only how long it takes to shift the rhinos from place to place, but also to look at various external factors which may influence the animals' behavior. These include such things as the location

of the other rhino, weather, keeper/animal interaction and reinforcement. Baseline data were collected from 1 January 1994 to 10 February 1994; and during this time, nothing was changed in the way the animals were shifted.

Prior to the start of behavioral training sessions, a training record was developed to allow us to monitor the animals, behavior and progress. We also evaluated each part of our rhino facility the indoor stalls, off-exhibit corral, and the rhino exhibit--to determine which areas were accessible for use in training sessions. These locations were then coded and a space for this information was included on the training form.

Our first step involved desensitizing the animals to being fed in a variety of locations and teaching them the cue "Come Over". The increased time that we spent with the rhinos and the establishment of a positive reinforcement history also helped us to strengthen our relationships with Bo and Rosie, providing a stronger foundation for the training process (Hediger, 1950; Petiniot, 1990).

In addition to the behavioral training sessions, we also began regularly utilizing environmental enrichment to help make the rhinos' enclosures more stimulating. Some of the items used included toys, favored food items placed throughout the areas, natural items like tree roots, scents and various types of browse.

We then introduced the concept of a bridge, in this case a clicker. The purpose of the bridge is to tell the animals that they have done something correctly and will be reinforced. Therefore, it bridges the gap between the behavior and the reinforcement, hence the name. Initially, the clicker was simply paired with food. As the rhinos' understanding of this concept developed, we began bridging desired responses as well. Throughout the training process we have been utilizing both primary (food) and secondary (praise, tactile, etc.) reinforcers. Negative reinforcement and punishment consist only of time outs, use of the word "no," and termination of the sessions (Forthman and Ogden, 1992).

The next step was target desensitization. Our targets are 10 inch x 10 inch plywood paddles with handles on the back. The faces of the targets are painted with yellow and black diagonal stripes, to allow for high contrast against a variety of backgrounds. At first, we simply carried the targets during sessions, to get the rhinos used to seeing them. We gradually held them closer and closer to the rhinos, until they appeared comfortable and unafraid.

Finally, the day arrived for the very first targetting sessions. The criterion for this behavior is that the rhinos touch their upper lip to the face of the target. If the lip is on the edge, or if they push or grab at the target, they are not reinforced. These initial sessions were somewhat anti-climatic, as the rhinos acquired the response quickly. At first, the targets were held directly in front of the animals; and gradually, the difficulty was increased by holding the target at various heights and angles.

Once the targetting behavior was being performed consistently, we began to teach the rhinos A to B behaviors. These sessions involve 2 keepers; each with a target, clicker and food. The A person calls the animal over to begin the session. They then pair the verbal cue "B" with a visual point towards the B person. The B person holds out the target and uses the verbal cue "Target." The B person bridges and reinforces the animal and then can send the rhino back, work other behaviors, or end the session.

At first, the distance from A to B was very short, as was the number of A to B's performed in a session. As the rhinos progressed, both of these criteria were increased gradually. Initially, the goal of this phase of training involved fading out the B person and teaching the animals to shift to remote targets which would be posted in each area. This goal was revised, however, due to the fact that it was difficult to consistently have both the time and staff available to conduct sessions before and after the zoo's public viewing hours.

In order to evaluate the progress of this phase of the training, we continually consult the shifting data that we have been recording. The shifting records are broken down into specific shifts--such as corral to exhibit, stall to corral, etc.--as well as by the duration of each shifting attempt. The figures on Tables 1 and 2 show the shifting statistics for January 1994 (baseline data) and January 1995, respectively. We measure the success of the rhinos, shifting by two factors: 1) whether or not the rhino shifted to the desired area, and 2) how long it took for the shift attempt.

As the shifting data show, there has been definite improvement in Rosie's shifting over the past year. This has resulted in saved keeper time and in Rosie being on exhibit and visible to the public on a more regular basis. Bo's shifting, however, has changed little. We believe that this is due to the fact that Bo's shifting difficulties occur primarily when Rosie appears to be in estrus. During these periods, Bo does not seem to want to shift away from her even for short periods, which is necessary due to the configuration of our rhino enclosures. Apparently our training, and the reinforcements that we offer, do not compare with the biological form of primary reinforcement that Rosie provides. This knowledge, though, helps us to make informed decisions about which animal to put on exhibit, and lets us anticipate and prepare for potential shifting problems.

The progress made during this phase of the behavioral training program is enhanced by several factors. First, the overall desensitization that has been worked into the training sessions appears to have helped make the rhinos more tolerant of a variety of external stimuli--including such things as screaming zoo visitors. Therefore, when the rhinos are on exhibit, they seem calmer and more relaxed than they have in the past (Hediger, 1950; Laule and Desmond, 1990). Additionally, the environmental enrichment component has been important in making the various areas more reinforcing to the rhinos. It is believed that simply increasing the amount of activity and stimulation for animals can reduce levels of problematic behaviors, and this theory seems to be supported in this instance (Laule, 1993).

The increased tractability of the rhinos was also evident in two specific incidences in late 1994. In November, a concrete pad was to be poured in the off exhibit rhino corral, directly adjacent to the rhino barn. This meant that the rhinos had to be kept inside the barn for a period of 3-5 days. Since our rhinos have not yet been put together, and we do not have an extra stall to shift them into, we decided to try to desensitize the rhinos to being locked in the shift hallway while a keeper went in and cleaned their stall. Within about two weeks, the rhinos were consistently shifting into the hallway for up to 30 minutes at a time. During this process, one keeper worked the animal and another cleaned. This training not only allowed us to maintain a clean and healthy environment for the animals during the maintenance work, but also gave us an option to shifting the animals outside in order to clean during very cold weather.

Then, in December 1994, Rosie developed a skin infection on her neck. In order for the veterinary staff to examine and clean the area, it was necessary for Rosie to come up to the vertical bars of her holding area and hold her head in position for several minutes twice each day. Since this was one of the areas in which training sessions were regularly conducted, Rosie appeared comfortable and tolerated this well. Later, on New Year's Day, an ultrasound was performed on the area. Even though we had never formally conditioned Rosie to accept this procedure, the general desensitization to people and stimuli involved in the behavioral training sessions was evident, as the necessary medical treatments were accomplished with minimal stress to Rosie and all involved.

In early 1995, we evaluated the progress of the training program and decided that shifting had improved to the extent that it no longer needed to be the main focus of the training program. Although we will continue to maintain the targeting and A to B behaviors, we are now turning our attention to the second goal, which is the training of husbandry behaviors to facilitate veterinary care.

A meeting was held with the keepers, veterinary staff and research staff. Various husbandry behaviors were discussed and behavioral goals set. Initially we will focus on two main behaviors. First, we will concentrate on teaching the rhinos to line up. This behavior involves the rhinos lining their

bodies up parallel to the vertical bars of the holding area so that we can easily access all areas of their bodies for examination and care. We will also begin conditioning a mouth open behavior, to allow for examination of the mouth, teeth and throat of the animals. Potential future behaviors to be conditioned include blood samples, saliva collection, rectal temperatures and ultrasounds, foot exams and urine samples.

In order to condition the line up behavior, it is necessary to teach the rhinos the concept of a body target. The goal of this behavior is to train the animals to move a designated part of their body to touch the body target, in this case a broom handle (McHugh, Lacinak and Force, 1989; Mehrdadfar, 1995). Initially, as with the original target, it is important to desensitize the animals to the new object. We began by carrying the body target (stick) with us during training sessions. We also allowed the rhinos to smell and touch the stick during this initial phase. Once the animals appeared unafraid of the stick, we began teaching them the actual concept of the body target.

The rhinos had a tendency to try to target on the stick with their lip. This was probably due to both curiosity and to the fact that the original targeting is done with the upper lip. To prevent this, we found it helpful to ask the rhinos to do a target before introducing the stick into their enclosure. In addition to the original target, we also conditioned a hand target and stay behavior with the rhinos. The criterion for the hand target is the same as for the original target, that the animals touch their upper lip to the palm of our hand. The stay behavior, however, is quite different. For this, we place the palm of our hand just above the rhino's upper lip and bridge them for keeping the lip down and relaxed. Both of these behaviors are very beneficial during sessions in helping us orient the animals while conditioning new behaviors (Laule and Desmond, 1990).

Once the hand target and stay behaviors were being performed consistently, we proceeded to begin conditioning the body target. First we asked the rhinos to target or to stay. Then we would hold the stick in the enclosure near the animal. If they maintained the target or stay behavior and ignored the stick, they were bridged and reinforced. The next step involved introducing the cue and touching the animals with the stick. Again the rhino was asked to target or stay. Then we used the verbal cue "Touch", touched the animal with the stick, and bridged. This step was repeated numerous times, to strengthen the association between the cue, the touch of the stick and the reinforcement.

Next comes the most difficult transition; from us touching the rhinos to them actually moving to the stick on their own. To work towards this, we start by repeating the above step. We say "Touch," then touch the rhino with the stick and bridge them. We then hold the stick right next to the animal and repeat the cue "Touch." Hopefully, at this point, generally by accident, the rhinos shift their weight and touch the stick. They are bridged and reinforced, and this step will be repeated until the rhinos begin to understand the concept. Currently we are working towards this step with both of the rhinos. Both are desensitized to the stick, and to being touched by it. We have also been able to bridge and reinforce them for moving to it on their own. They do not, however, appear to understand the concept yet; and their successes are accidental, not deliberate.

The other behavior being trained right now is the mouth open. Since rhinos can be prone to mouth ulcerations, our veterinarian has requested that this be one of our priorities. Once trained, the behavior can also be generalized easily to include other facets, such as saliva samples for research purposes. The conditioning of this behavior begins with the stay that was described earlier. The rhino is asked to stay, then we lift their upper lip and use the verbal cue "Open." If the animal's lip is relaxed and they allow us to lift it, we bridge and reinforce them. The next step involves the use of two hands: one hand lifting the animal's upper lip, and one touching the corner of their mouth. Since both of the trainer's hands are needed when working this behavior, a verbal "Good" is substituted for the clicker as a bridge. Once the animals begin to understand the concept of the behavior, we gradually increase the length of the mouth open. This behavior is progressing very well with our animals, especially Rosie.

The rhino training program has become an integral part of our animal management program at Zoo Atlanta. This project has also given those involved the opportunity to learn and develop new skills and abilities. Increasing our behavioral control of the rhinos will facilitate all aspects of their care, including reproductive management. While an initial investment of time and labor is required, the resulting benefits help us as we strive to achieve the highest level of animal care.

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Table 1
RHINO SHIFTING DATA - January 1994

Rosie

Area*		1 min.	1-4 min.	5-9 min.	10+ min.	Didn't Shift	N=
From	To						
E	C	50%	50%	0%	0%	0%	2
C	E	0%	22%	0%	0%	78%	9
R	C	5%	40%	0%	0%	55%	38
C	R	82%	18%	0%	0%	0%	17
B	C	50%	25%	0%	0%	25%	4
C	B	75%	25%	0%	0%	0%	4
B	R	100%	0%	0%	0%	0%	9
R	B	100%	0%	0%	0%	0%	8

Bo

Area*		1 min.	1-4 min.	5-9 min.	10+ min.	Didn't Shift	N=
From	To						
E	C	75%	25%	0%	0%	0%	16
C	E	19%	56%	13%	6%	6%	16
R	C	60%	40%	0%	0%	0%	5
C	R	0%	100%	0%	0%	0%	1
B	C	34%	47%	0%	3%	16%	32
C	B	19%	66%	15%	0%	0%	32
B	R	86%	14%	0%	0%	0%	7
R	B	0%	100%	0%	0%	0%	2

Table 2
RHINO SHIFTING DATA - January 1995

Rosie

Area*		1 min.	1-4 min.	5-9 min.	10+ min.	Didn't Shift	N=
From	To						
E	C	90%	10%	0%	0%	0%	10
C	E	56%	44%	0%	0%	0%	9
R	C	43%	39%	9%	0%	9%	23
C	R	93%	7%	0%	0%	0%	30
B	C	0%	0%	0%	0%	0%	0
C	B	0%	0%	0%	0%	0%	0
B	R	100%	0%	0%	0%	0%	1
R	B	0%	100%	0%	0%	0%	1

Bo

Area*		1 min.	1-4 min.	5-9 min.	10+ min.	Didn't Shift	N=
From	To						
E	C	83%	17%	0%	0%	0%	12
C	E	31%	46%	15%	0%	8%	13
R	C	0%	0%	0%	0%	0%	0
C	R	0%	0%	0%	0%	0%	0
B	C	34%	34%	0%	4%	28%	29
C	B	17%	43%	17%	10%	13%	30
B	R	60%	40%	0%	0%	0%	5
R	B	50%	50%	0%	0%	0%	2

***Area Codes:** E = Exhibit
 R = Rosie's Stall

C = Corral
 B = Bo's Corral