

Operant Conditioning of Indian Rhinos (*Rhinoceros unicornis*) in Night Safari

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ABSTRACT

Operant conditioning enables safer animal management for both animals and keepers, reduces stress and risk of medical treatments, and provides mental stimulation. It relies on the cooperation of the animal based on its desire for rewards, thus the need for physical restraint and negative reinforcement are minimised. The Indian Rhinos at Night Safari, Singapore undergo an operant conditioning programme to facilitate safe husbandry and to allow performing a range of routine medical procedures without the sedation. This includes weighing, blood draw and rectal ultrasound. When developing operating conditioning programmes, each animal should be treated as an individual, as the same method which is effective for one animal may not work as well for another. This is especially true for our rhinos, as each of them has its own particular disposition and quirks. This paper represents a preliminary compilation of data referring to our experiences in operant conditioning with the one male and two female rhinos in our collection.

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1. Introduction

1.1 Operant Conditioning

Operant conditioning programs have become popular in zoos internationally, as it enables safer animal management for both animals and keepers. It relies on the cooperation of the animal based on its desire for rewards, thus the need for physical restraint and punishment are minimised. It also reduces stress and risk of medical treatments through desensitisation and enables procedures to be carried without the use of anaesthesia. Operant conditioning training also provides mental stimulation, which enriches the animals' welfare. Numerous institutions have been successful with operant conditioning programs for their rhinos and the basic principles have been described in other publications such as Fouraker and Wagener (1996). Thus this paper is not meant to be a manual on operant conditioning, rather a documentation of our own experiences of operant conditioning with the rhinos in our collection.

1.2 Indian Rhinos at Night Safari

Night Safari, Singapore has three adult Indian rhinos in our collection, one male and two female. They are housed individually in adjacent enclosures. Each of them has access to their own barn, yard and exhibit; however the enclosures are interconnected and the animals can be moved around internally and swapped when necessary. In this manner, we are able to utilise the same weighing scale, raceway and squeeze cage for all the three rhinos (Fig. 1).

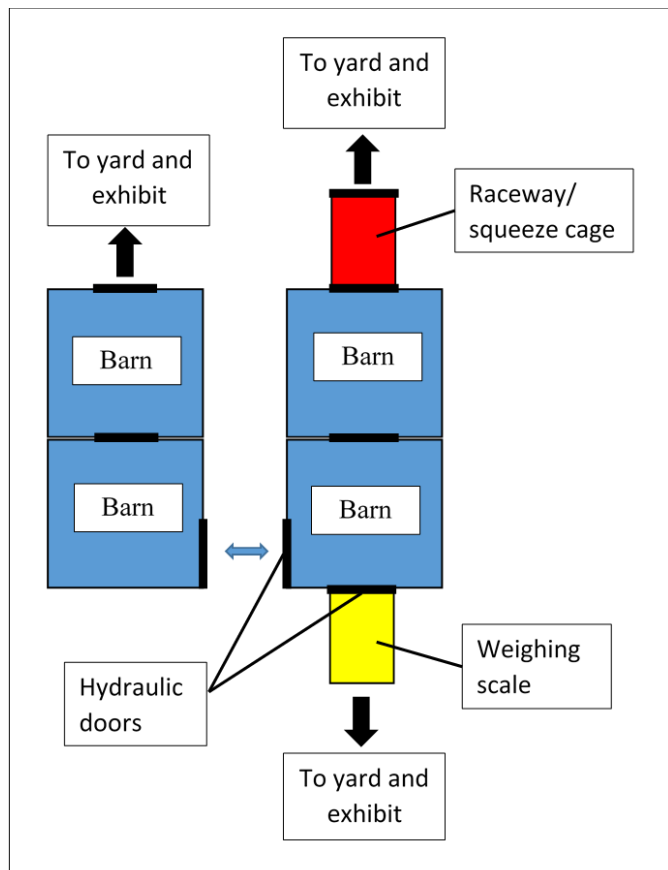


Fig. 1. Locations of the hydraulic doors, weighing scale and squeeze cage. Keepers' doorways are not shown. Not drawn to scale.

When developing operating conditioning programs, each animal should be treated as an individual; the same method which is effective for one animal may not work as well for another. This is especially true for our rhinos, as each of them has its own individual disposition and quirks. The male, named “Gurkha”, was born on 25th June 1985 and arrived at Night Safari in October 1989. Although he can sometimes be slow to respond to targeting and verbal cues, he is usually calm and stoic when it comes to medical procedures and is the easiest to work with. “Gomati”, the oldest among the three, is more unpredictable and temperamental. She was born on 9th January 1979 and arrived at Night Safari in May 1997. “Mary” is the youngest and also the most recent addition to the collection. She was born on 5th September 1989 and arrived at Night Safari in April 2009. She has a wary disposition and often takes the longest to get used to anything new. Mary had underwent some operant conditioning at her previous institution before coming to Night Safari.

2. OPERANT CONDITIONING BASICS

2.1 Training Goals and Plan

The key to a successful operant conditioning program is to have a well-defined training goal and plan. Consistency and a strong understanding of the individual animals’ behaviour are critical, thus currently all training is planned and directed by one person, our head keeper, who has been working with the rhinos since 2004. As there is a repertoire of several established behaviours, we may focus on certain aspects as might be imminently necessary, for example increasing the frequency of conditioning for injections when a scheduled jab is upcoming.

Approximations of each step towards the desired behaviour are mapped out in the training plan. As we have several keepers involved in the training, every trainer must be clear of the desired goal, and aware the steps in between to achieve the overarching end result. Sometimes, the rhino may master a particular approximation much quicker than expected, thus it is important to have the next few steps in mind such that the training can proceed at a pace that is rewarding for the rhino. Daily records are kept to monitor progress and facilitate communication between all the trainers.

Each training session is kept short and sweet to encourage participation, usually about 10 to 30 minutes. If at any time during the training the rhino balks or seems

unwilling, the trainer would go back to a point where the rhino is comfortable, and then either end the session on a positive note, or proceed again slowly.

Ideally, conditioning should be done regularly and consistently. However, due to constraints, there were some gaps in the animals' conditioning, for example during the translocation to a new area in 2010; particular days with unforeseeable manpower shortage; and when it was necessary for the animal to undergo medical treatment. In addition, we observed that our animals were not as responsive to training under certain conditions, such as bad weather; or if the females are on estrous; or if there is unusual commotion such as construction or maintenance works in the vicinity; or the presence of too many unfamiliar people.

2.2 Establishing the Bridge

A box clicker is used as a bridge or secondary reinforcer to pinpoint the exact desired behaviour, followed up by the token feeding which is the primary reinforcer. Token feeding should be the animal's favourite food for maximum incentive. We use mainly carrots chopped up into small pieces. The food used during training sessions is taken out from the daily diet to avoid overfeeding.

2.3 Target Training

The target can be anything that is easily visible to the rhino, preferably with a long handle to enable easier positioning; for example currently we use a paddle (Fig. 2). To begin with target training, we touch the target to the animal's snout, click and follow up with feeding. The animal should begin to associate touching the target with the click and reward. Once the animal is more confident, move the target slightly



further away, such that it needs to stretch or even take a step forward to touch the target. All our rhinos managed to get the idea of touching the target quickly, within two or three sessions.

Fig. 2. Paddle used for targeting.

2.4 Verbal Cues

A verbal cue is introduced after the desired response has been learned. For example with target training, once the rhino learned to touch the target consistently, the verbal cue “target” was used in conjunction with the presentation of the target, to associate the desired behaviour with the cue. Other verbal cues we use are “back off” to cue the rhino to move backwards, and “foot” to present its foot.

3. RACEWAY AND SQUEEZE CAGE



Fig. 3. Rhino squeeze cage cum foot bath.

The raceway is located such that the rhino has to pass through it from the barn to access the yard and exhibit, enabling the animal to be exposed daily to the structures and remain familiar with them. There are hydraulic doors on both the front and back ends, enabling the rhino to be confined inside. As rhinos sometimes refuse to completely enter a short chute (Schaffer et al., 1998), removable bars were installed along the front of raceway to enable the animal to be moved backwards in the raceway after the hydraulic door has been closed behind it (Fig. 3). Access to the animal’s rear end for ultrasound or other rectal examinations is achieved through the vertical bars of the hydraulic door. Adjustable bars from the side serve as a squeeze to limit the chute width (Fig. 4), preventing the rhino from excessive lateral movement which can endanger the examiner. The raceway also serves as a footbath when necessary. To

date, Mary is still somewhat nervous about the door closing behind her in the raceway unlike Gurkha and Gomati who are quite comfortable being confined within it as long as they are being fed or targeted to stay in position.



Fig. 4. Front view of rhino squeeze cage.

4. WEIGHT-TAKING

The weighing scale was first installed in September 2011. The scale was constructed above the ground level of the raceway between the barn and yard, covered with a layer of galvanized iron. Two small slopes were added on to both ends of the scale to facilitate the rhinos' movement up and down the platform. Gurkha and Gomati were readily conditioned to going up and down the scale with no problems but despite similar efforts and the same environmental conditions, Mary refused to go up after the very first time. It is unknown exactly what deterred her, although we speculate that something about the first experience made her wary of going onto the scale again. Some possible reasons may be because the scale was on a raised platform which made her feel insecure; or that the galvanized iron was an unfamiliar texture under her hooves; or that she was alarmed by the creaking sounds produced when her weight was shifted. From August 2013, her daily feed was placed at the near end of the weighing scale to acclimatise her to it. Gradually over the next two months, the food was placed further and further towards the centre of the weighing scale. It was observed that she would avoid stepping up onto the weighing scale and instead stretch her neck as far forward as possible to reach the food.



Upgrading works were done in April 2014 to lower the weighing scale flush with ground level and the platform was covered with a layer of black rubber matting. By the end of May 2014, Mary was able to stand fully on the weighing scale, although she would still stretch out her neck to reach her food which was placed just past the edge of the scale.

Fig. 5. Mary standing fully on the weighing scale, but reluctant to step further and stretching to reach her feed which was placed just beyond the edge of the scale.

By mid-August 2014, she was moving in and out over the weighing scale comfortably thus we started to conduct operant conditioning sessions in the weighing scale raceway and also desensitising her to the hydraulic door closing behind her. We now take weights for all our rhinos once a week.

5. INJECTION

The rhinos are conditioned for injections in the squeeze cage to minimise lateral movement, as the injection site is usually on either side of the neck. Once the animal is comfortable inside the squeeze cage, we begin by using our hands to touching the rhino's shoulder, moving gradually closer to the sensitive neck area and reinforcing non-response. Thereafter we move on to lightly slapping and poking the area to desensitise the animal. The next step is then use alcohol to wipe down the injection site and then applying pressure using a blunt needle. The final approximation would be to desensitise the rhino to the prick of a sharp needle.

The vets utilise either a pole syringe or butterfly needle for injections. Due to the large doses required for such large animals, pressure from the injection will

unavoidably cause the animal some pain and discomfort. The keepers and vets discuss and decide on the best option case by case, depending on the temperament and how comfortable the individual rhino is with the injection process. For some of our animals, the sharp but momentary jab of the pole syringe is preferable to the less painful but prolonged injection using the butterfly needle. For example, Gurkha tolerated daily injections of antibiotics using a butterfly needle on alternating sides of his neck for two weeks before he started to react negatively. On the other hand, Mary would start shaking and tossing her head the after the butterfly needle was inserted, thus dislodging it. In her case, we decided to give her biannual jab of Improvac by pole syringe instead.

6. BLOOD DRAW

Blood draw for rhinos is typically done from either ears, legs or tail. All our rhinos were conditioned for blood draw from both foot and ear. However, we were not so successful with drawing blood from the foot with Gomati as the blood would not flow properly, so we focused on conditioning her for blood draw from the ear. On the other hand, Mary appeared to particularly dislike having her ears touched. She would become agitated, swaying her head from side to side and flicking her ears constantly. Thus we focused on conditioning for blood draw from the foot. The process of conditioning is similar to that for injections.

For medical procedures, the participation of the vets during conditioning can help eliminate any surprises during the actual event. For example, we did not anticipate that the rhinos would be alarmed by the sound of a spray bottle used to spray alcohol by the vets.

7. RECTAL ULTRASOUND

For ultrasound procedures, the rhinos first needs to be very comfortable being in the confined space of the squeeze cage. This is particularly crucial because we need to access the animal's rear through the vertical bars. To avoid injury to the examiner while his or her arm is inserted into the rectum, we want to minimise any side to side movement.

We began ultrasound conditioning for Mary in June 2011, and took a few days to get acclimatise her to the removable bars in the front and the adjustable squeeze bars at the side. We also had to get her used to people moving around behind her, which made her especially uneasy as she could hear but not see them. The vets worked closely with us for conditioning for rectal ultrasounds. We began by touching her rump with our hands, moving gradually towards her rectal area. Care was taken not to startle her by touching her suddenly without warning, as we were out of her field of vision. We then moved on to lifting her tail to the side and touching around the anus before eventually starting to insert a lubricated hand and then eventually arm into the rectum.

Rectal ultrasound was successfully done for Mary in July 2011, after about a month of conditioning, and again on 17 April 2012. The same methods have also been used for other rectal examinations and treatments such as the removal of boluses from a constipated rhino.

8. CONDITIONING TO NEW ENCLOSURES

8.1 Crate Training

Animals are crate trained to reduce the stress involved when it is necessary to relocate them. Crate training a rhino is not unlike training any other animals, except for the size of the crate to accommodate a full grown rhino. Rhinos can be uncomfortable with entering a small, unfamiliar space, especially one which comes to a dead end (Schaffer et al., 1998). Forced crating of rhinos without training or immobilisation is strongly discouraged (Fouraker and Wagener, 1996).

The crate was first introduced into the environment, to allow the animal to get comfortable with its presence. The crate was chained to the bars in the raceway with the front end closed. The rhino was fed in the adjacent barn, with the food gradually placed closer to the crate over the next few days. After the fourth day, the feeding was placed at the mouth of the crate and over the subsequent days gradually placed further inside the crate. In about two weeks their food was given at the closed front end of the crate daily to allow the rhino to get comfortable going all the way into the crate.

8.2 Yards and Exhibits

8.2.1 Introduction to mixed exhibit

One of our rhino exhibits is a mixed exhibit with Indian sambar deer. Gomati was first introduced to the four female deer on 17th August 2010, for an hour. Food was given in the exhibit to provide a positive environment. All were cautious initially but Gomati lost interest in the deer shortly and started feeding and thereafter went into the mud wallow. The deer remained cautious but were also observed feeding and roaming around the exhibit after a while.

8.2.2 Swapped enclosures

In October 2013, Gomati started having foot issues and slowing down due to her advanced age. It was decided that she should swap enclosures with Mary to avoid the steeper slopes and longer distance from her exhibit. Conditioning by daily swapping of barns began in late January 2014. Gomati had no problems and settled down in the new enclosure quickly, and was displayed in the new exhibit during night operation hours. However, in the other enclosure, the weighing scale had been installed in the raceway in between the barn and the yard, and Mary was reluctant to go on and over it. As the yard and access to the exhibit was on the other side of the weighing scale, a full swap of the enclosures could not be completed and Mary was still given access to her old barn and yard during the day.

Even after three months of daily habituation starting from late January 2014, Mary was still unwilling to walk through the raceway over the weighing scale leading to the yard. Targeting and even coaxing with food was not successful in bringing her across to the yard. As she was particularly reluctant to go up the small slope to the weighing scale, works were done to lower the weighing scale to ground level in early April 2014.

Daily feed was placed on the leveled weighing scale itself to encourage Mary to step onto it. She would stretch her neck and lean as far forward as possible to grab some food in her mouth, then quickly back away into the barn, pulling the food in with her. Over the period of four months, the food was gradually placed further and further

along the raceway, and then past the raceway and into the yard. Mary would be wary when entering the raceway to get to the food, often backing away quickly at the keepers' approach or the sound of the hydraulic door being turned on. She would stand on the weighing scale and stretch forward to reach the food, but not step any further into the yard. It is possible that due to the shape of the yard, she was not able to see past the bend after the raceway and thus believed that it was a dead end even though the yard opens up to a larger area. This may have contributed to her reluctance to move further out past the raceway.

On 2nd August 2014, Mary finally stepped off the weighing scale and onto the cemented part of the yard for the first time. On 8th Aug 2014, a breakthrough was achieved when she was spotted in the yard for the first time during the night. This first venture into the yard appears to have been an epiphany for her as though she suddenly realized that it was not a dead end. Her behavior changed, literally overnight, from refusing to step foot into the yard, to going in and out into the yard frequently. Thereafter, her daily feed was placed outside in the yard to reinforce the behavior. In the subsequent few days, she was still nervous about being in the yard as she would occasionally turn back and run into the barn. Eventually she became more comfortable in the yard and was conditioned to the barn door closing.

9. CONCLUSION

Each animal is an individual, and should be treated as such. No two animals will respond to conditioning in exactly the same way. With some patience and a little flexibility to cater for individual needs, operant conditioning can be very rewarding for both animals and staff involved.

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