

Elephant Facility Standard Operation Procedure

Revised 29 April 2008

Introduction: The Riverbanks Zoo's elephant herd is maintained in protected contact where all of the medical and husbandry behaviors are maintained without sharing the same enclosure with the animal. These behaviors are conditioned where the animal presents a specified body part near or through the barrier to accomplish the desired objective. The protective barrier should never be considered as the only measure that prevents an elephant from causing injury to a keeper. Instead, it is the position of the trainer in relation to the barrier and the animal that ensures their safety. This document was generated to inform the trainer on how this can be accomplished while performing necessary husbandry and medical procedures and to maintain safety for the animals. Many of the daily behaviors can be accomplished without a trainer being in a vulnerable location in relation to the animal's head, trunk and feet. However, there are some behaviors such as, TB trunk wash, tusk socket flush and front foot care where the trainers must position themselves in potentially dangerous location. This document will address each one of these specifically to ensure that they are carried out as safely as possible.

Keeper Safety

I. General Guidelines:

- All aggressive responses elicited by an elephant towards a trainer must be reported to Elephant Supervisor as soon as possible.
- It is of utmost importance that the trainer remains focused while working with an elephant. If distractions occur that threatens this focus, the session should be ended immediately.
- Conversations on the radio or from co-workers during a training session should be avoided and cell phone use is prohibited.
- A minimum of two animal keepers must be present in the elephant barn when training, feeding or shifting an elephant.
- The animal's attitude and behavioral thresholds should continuously be monitored.
- Trainers should never stand directly in front of unprotected locations (keeper stall entrances or areas without strike chains) when elephant is front facing.
- All staff must read and abide by the Departmental *Lock Policy*

- All personnel must read and be prepared to implement emergency procedures as described in the *Dangerous Animal Escape Policy*.
- Trainers should never place their arms between the barrier and the animal during physical exams, tactile desensitization or delivering tactile reinforcers.
- Reinforcers should be delivered on the ground unless behavior requires a different location. The exceptions are oral exam, TB trunk wash and tusk socket flush.
- Visitors and Education groups entering the animal holding area must abide by the staff members requests and remain behind the yellow line.
- All staff must follow the *Behind the Scenes Tour Policy*
- Primary containment exhibit barriers are never to be opened after normal operation hours unless appropriate Animal Division Supervisors are present.

II. Public Demonstration and Shifting;

- Reinforcers should only be delivered on the ground.
- The animal will only be trained utilizing NO CONTACT.
- Trainers must remain a trunk's distance from the elephant.

III. Tusk Socket Flushes;

- The elephant's trunk should be in the upright position before approaching the barrier.
- Trainers should approach from the side, not directly in front of elephant
- Trainers should never stand directly underneath the trunk while it is in the upright position.
- Trainers should position themselves so that a barrier pole is between them and the animal.
- Once flush procedure is complete, trainers should move to a safe distance before releasing the trunk from the upright position.
- Food reinforcers can be tossed directly into the elephant's mouth keeping hands from passing through the barrier.

IV. Oral Exams;

- The elephant's trunk should be in the upright position before approaching the barrier.
- Trainers should approach from the side, not directly in front of elephant

- Trainers should never stand directly underneath the trunk while it is in the upright position.
- Trainers should position themselves so that a barrier pole is between them and the animal.
- Once procedure is completed, trainers should move to a safe distance before releasing the trunk from the upright position.
- Food reinforcers can be tossed directly into the elephant's mouth keeping hands from passing through the barrier.

V. Foot care, foot radiographs and blood draw procedures:

- Procedures are to only be performed utilizing two qualified elephant keepers. One is assigned to foot trimming, nail filing x-ray plate positioning or blood draw. The other will position the elephant, delivering reinforcers and monitoring the animal's behavior.
- Procedure will only be performed in locations with strike chains or mesh barrier.

VI. TB Trunk wash/ Enrichment Painting:

- This behavior should be performed in areas with strike chains or designated openings in mesh barrier, not in unprotected locations
- Trainers should position themselves so that a barrier pole is between them and the animal.
- Trainers should never stand directly underneath the trunk while it is in the upright position.
- Food reinforcers can be delivered to the elephant's trunk.

Animal Husbandry and Safety

I. General Guidelines

- Inspect the animals' physical condition upon entering the barn in the morning, observing their hay consumption from the previous night, stool quality, skin and foot condition, and overall behavior documenting any abnormalities on the daily report. Notify Veterinarian of any medical concerns.
 - All exhibit and holding area barriers must be checked daily to ensure that they are in appropriate condition to ensure animal containment.

II. Shifting

- Ensure all staff members have exited the enclosure before shifting the animals into the specified location.

- Always station the animals away from the transfer doors when doors are in motion. If an event occurs where a door must be moved and the animal cannot be stationed away from the door a visual must be maintained of the door in motion and the animal at all times.
- The appropriate door number must be identified by staff member stationing the animal and repeated by door operator prior to moving door.

III. Foot Care and Inspection

- All feet must be inspected on a daily basis.
- Foot care will be provided and documented on a routine basis, notifying Veterinarian and Curator of any concerns.

III. Enrichment and Training

- Organized training must occur on a routine basis and documented in the animal training logs.
- Enrichment will be performed as specified in the animals' enrichment protocol and documented accordingly.

IV. Temperature/Inclement Weather Guidelines

Daytime

- Elephants may be shifted onto exhibit during good weather conditions and temperatures 40°F and above
- When temperatures are below 40°F elephants are given access to the barn
- If there is a steady, cold rain elephants are given access to paddock and one stall in barn
- During strong storms (ie High winds, lightening, hail, torrential rain), elephants are given access to the barn
- Access to the shade structure and outdoor paddock is given when temperatures are 85°F and above

Nighttime

- Elephants are given access to the exhibit, paddock, and stalls #1,2,3 when temperatures are 45°F and above
- When temperatures are below 45°F animals are closed into barn
- The roll doors and windows to the barn may be left open when temperatures are 45°F and above. All roll doors and windows will be closed and the heat turned on when the temperatures are below 40°F

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John Davis

Elephant Blood Draw

- I.** Identify the vessel
 - Identify the quadrant (A,B,C,D) and start from the distal portion of the ear.
 - Veins are the target. They are a more relaxed vessel that doesn't have a pulse. Arteries are under more pressure. Veins do not refill when held off.

- II.** Scrub area with alcohol and gauze
- III.** Utilize a 21 gauge needle, held at an angle, and penetrate quickly.
 - Hold butterfly handles with hole of needle facing up.
 - Coordinate with trainer of when you are sticking to reinforce no reaction.

- IV.** Reposition needle if necessary to ensure blood flow.
- V.** Connect blood tube
- VI.** If you miss, take a break, continue to reinforce other behaviors and rehearse ear presentation. Try again in 15 minutes. If you miss again, reschedule for p.m or next day.

Elephant Enrichment Protocol

Species: 0.4 African Elephant (*Loxodonta africana*)

Diet:

- Coastal hay available on exhibit throughout the day.
- Produce portion of daily diet as well as a variety of breads may be utilized for training (both on exhibit and in backup area) and for shifting.
- Produce portion of daily diet may be hidden or broadcast on exhibit.
- Logs available on exhibit. Replaced as consumed.
- Local approved browse offered on exhibit and/or in backup area as available.
- Novelty food items such as watermelons, pumpkins, bananas, banana plant leaves and stalks, and sugar cane may be offered on exhibit and in backup area as available.

Commonly Used Species from "Approved Browse" List:

- Bamboo (including stalks)
- Mimosa
- Sweet gum
- Tulip Poplar
- Willow

Natural Stimuli:

- Animals together on exhibit daily. Visual, auditory, olfactory and limited tactile access to each other when separated in backup area at night.
- Exposure to natural sunlight, photoperiod and weather on exhibit.
- Exposure to natural sunlight and photoperiod in backup area, weather permitting, via large window and door areas.
- Exhibit terrain includes a slope and a dry moat providing increased exercise opportunities such going down into the moat and climbing back out.
- Boulders for rubbing and scratching are on exhibit.
- Substrate, consisting mainly of sand, on exhibit for dust bathing. Replaced as needed.
- Access to large deadfall (used as secondary barrier) on exhibit.

Artificial Stimuli / Furniture:

- Visual, auditory and olfactory stimuli from and interaction with visitors viewing exhibit from walkways along front and sides of exhibit.
- Gunite boulders (in addition to natural) on exhibit for rubbing and scratching.
- Exhibit includes a 200,000 gallon gunite pool with two sets of steps to enter and exit the pool.

- Hosing may be offered during temperature appropriate days on exhibit or in backup area.
- Warm water drinks may be offered via hoses in the backup area.
- Food tosses on exhibit three times per week.
- Paper bags and cardboard boxes (free of staples or tape) with or without treats, scents, and ice blocks (plain or with treats) may be offered periodically on exhibit or in backup area.
- Tires of various sizes and rubber balls may be offered in backup area.

Training / Keeper Interactions:

- Daily AM operant conditioning of behaviors for husbandry and medical care. Provides mental stimulation as well as physical activity.
- Daily educational demonstration of conditioned behaviors given by alternating trainers on exhibit for visitors. Provides mental stimulation as well as physical activity.
- Enrichment Painting in backup area.

Updated: 10 Sept 2008

Riverbanks Zoo and Garden's Elephant Exercise Protocol 01-11-2007

Obesity has been identified as a contributing factor leading to joint and ligament defects in the legs and feet of captive elephants. A high incidence of stillbirths in captive elephants may also be related to overweight conditions of the mothers. Studies comparing elephants' weights of both working (circus and elephants in Asian logging camps) and elephants held in zoological institutions that found zoo elephants weighing 31-72% more [Taylor, V.J. and Poole, T.B. 1998]. This difference was attributed to whether they were trained and exercised daily. Therefore, Riverbanks Zoo and Garden have developed an optimal exercise program for the elephants in their collection ensuring not only the physical but also, the psychological well being of the animals in their care.

Due to the mild climate in the southeastern region of the U.S., the elephants are able to access their spacious, 1 acre exhibit, complete with a 300,000 gallon pool, virtually every day of the year. Minimum day time exhibit temperatures have been established at 35 °F. with access to the barn, allowing animals to move back and forth between the exhibit and heated barn. Temperatures 40°F. and above, the animals are given access only to the exhibit during business hours (9:45am-5:00pm). Night time temperatures of 45° F and above, the elephants can have access to the exhibit, paddock, and one stall all night. More stalls are utilized during rainy nights to allow animals more shelter. When temperatures fall below 45° F they need to be closed into the barn for the night. Coastal bermuda hay and enrichment items are distributed throughout the exhibit encouraging the elephants to be active while foraging prior to shifting the animals to the exhibit.

The elephants are trained daily, prior to being shifted to the exhibit, in order to perform daily husbandry and medical procedures. Riverbanks Zoo and Garden has adopted a protected contact management where the elephants are trained to perform many body positions for daily inspection of their entire body, included feet, skin eyes and ears. Training the animals' to step up into the ERD for routine weighing is also an activity the elephants perform for physical activity and psychological stimulation. The animals are shifted one by one to their exhibit by following the trainer through the outside paddock and onto the exhibit to forage.

A mid-day shift has been established to allow keepers to service the exhibit, distribute fresh hay and enrichment items, bath the elephants when temperatures allow, and increase more training opportunities. While on exhibit the animals are routinely provided with enrichment items that usually consists of seasonal local browse, hosing during the summer months, or food tosses that also increase activity.

Taylor, V.J. and Poole, T.B. 1998. Captive breeding and infant mortality in Asian elephants: A comparison between twenty western zoos and three eastern elephant centers. *Zoo Biology* 17: 311-332.

Elephant Foot Care

Introduction: All feet are inspected daily for cracked toenails, excessive fungus growth or foreign objects embedded in the foot pad. Every foot is trimmed and toenails are filed every three-four weeks depending upon the elephant and weather conditions. Seasonal weather conditions effect the rate of fungus growth and warm moist conditions requires frequent trimmings.

Goal: Conservatively trim foot and file nails to remove all fungal growth and cracks to ensure protection from trauma (rocks) and allow for sufficient pad and nail protection. Limit the time to 15-20 minutes per foot. When trim is completed, animal should bare weight evenly on all of the foot.

I. Pads

- Clean foot using a brush to assess foot condition. Sand will dramatically decrease the life of the blades.
- Lightly scrape surface of the pad to identify problem areas. Fungus will not always be obvious until first layer is removed.
- Fungus will appear as a dark spot, sometimes very small until further trimming occurs.
- Continue to scrape area where fungus has penetrated, removing small amounts at a time until it is gone.
- Depth you trim is monitored primarily by color and texture. Black>Dk. Brown>light brown>white>pink>blood (vascular tissue). Seldom should you trim beyond the light brown layer. Could cause soreness after trimming.
- Texture and hardness can be used to monitor pad thickness.
- If you can't remove all of the fungus by the light brown area, schedule follow-up trims in one week. Usually just opening up the area and exposing it to air will often remedy the problem.
- Blend rest of the pad where fungus was removed, attempting to make pad a uniform surface.
- Lightly trim pad edges. Fungus will also invade the foot-pad junction.

II. Nails

- When animal is bearing weight on foot, nail should just meet or be off the ground ¼ inch. Cracks can develop from too much pressure on the nail.
- If crack is starting to develop, open up the crack using a file. Extreme care should be utilized during this process to not cut into vascular areas. The nails are thin compared to the pad and often the crack cannot be eliminated in one trimming. Files are the safest ways to address toenail cracks.
- File corners of nails to create an open area around cuticle to eliminate possible fungus growth between nails.
- Nails grow from the cuticle downward and excessive filing should not be done on the nail surface. This causes the nail to be thin and more susceptible to cracking and injury.
- Inspect cuticle growth around edges and remove it with the small file if it becomes excessive.

Reviewed 1-11-2007

MANAGING ELEPHANTS WITH PROTECTED CONTACT

There are four primary components of protected contact elephant management. They are:

1. ENHANCED SAFETY BY THE PHYSICAL SHIELDING OF THE KEEPER THROUGH

- facility design
- trainer position
- animal position

SAFETY- Keeper safety is the driving force behind the development of protected contact. It is everyone's responsibility. If a keeper sees a situation that seems unsafe, it is the keeper's responsibility to immediately alert the individual at risk, and then report the incident to the area supervisor. Established safety protocols for operating in protected contact are strictly enforced.

PHYSICAL SHIELDING- As the phrase implies, protected contact refers to a keeper's ability to have contact with the elephant while being shielded. Shielding refers to both the facility (which is designed for the keeper's protection) itself and to where the animal is standing in relation to the keeper and the facility. The keeper must always position him/herself and the animal so as to be shielded, as much as possible, by the facility.

At no time is unprotected contact with an elephant allowed during a protected contact training session. In protected contact, keepers are not allowed to walk inside the enclosure to assist in the training of the animal. Keepers are to avoid moving within range of physical contact, unless the animal is stationed in such a manner as to make an aggressive act difficult for the elephant to manage. As with all elephant activities, a second person is also required to be present in protected contact training.

2. THE EXCLUSIVE USE OF POSITIVE REINFORCEMENT AND OPERANT CONDITIONING TECHNIQUES IN ORDER TO MODIFY ANIMAL BEHAVIOR

EXCLUSIVE USE OF POSITIVE REINFORCEMENT- The positive reward system involves presentation of a variety of reinforcers including tactile, voice, food, food variety, and social rewards. Reinforcement is delivered when the animal performs correctly in response to a specific signal. If the animal performs a behavior incorrectly or in a manner not up to standard, it is simply given another opportunity to earn the reinforcement. In protected contact, behavior modification will be accomplished exclusively through the established principles of behavioral theory as it applies to operant conditioning.

3. **NO PHYSICAL DISCIPLINE-** In the protected contact system, no physical discipline of the animals is permitted for any reason whatsoever.

4. **RE-DIRECTING ANY AGGRESSIVE BEHAVIOR THROUGH STRATEGIES WHICH ARE INCOMPATIBLE WITH THE TOPOGRAPHY OF THE AGGRESSION** - Operant conditioning provides a mechanism which can be used to reinforce an animal's positive attitude. Behavior modification techniques can also be used to reinforce positive social interactions between working members within the herd. Mitigating herd dynamics is a critically important issue for the successful protected contact management of the herd. Operant conditioning provides the only safe and positive means to manage herd dynamics.

Our primary strategy in the redirection of aggression is to identify where and when aggression is likely to occur and then work to develop strategies and means to prevent the aggression from happening in the first place. Dealing with aggression after the fact always presents greater difficulty and potential danger.

DEFINITIONS

OPERANT CONDITIONING- refers to the systematic conditioning process of shaping an animal's behavior toward a desired goal. Operant conditioning is a part of the well-established principles of behavior theory. In the protected contact system, behavior modification is accomplished exclusively through the use of positive rewards including food treats, variety, and secondary reinforcers.

PROTECTED CONTACT- refers to a management system used by the Riverbanks Zoo to maintain physical contact with our captive elephants while maximizing keeper safety. The elements of protected contact elephant management include a combination of the following: facility design, animal and keeper position relative to protective barriers, and operant conditioning techniques designed to encourage the elephant to voluntarily comply with the keeper's objectives. There are three components to our elephant management strategy. In addition to trained voluntary compliance with husbandry behaviors, we will also make use of the elephant restraint device or ERD. .

SOME OPERANT CONDITIONING BASICS

Training is a creative process. There are as many ways to train a given behavior as there are trainers. Behavioral theory outlines the principles for successful behavior modification. The application of technique in a specific circumstance is left to the trainer's subjective judgement based on past experience and the boundaries of our protocols.

There are many important tools in the trainer's repertoire for shaping behavior and it is beyond the scope of this manual to delve into them all. For the purpose of an introduction to our training methods, we have selected three of the most frequently used training tools and applied them, step by step, to three common training problems.

TECHNIQUE: CONDITIONING BEHAVIOR: THE BRIDGING STIMULUS

The animal must be healthy and eating well. Elephants are different from most animals in that they always seem to be ready to eat. For most animals, a food base (measured or weighed) must be established. It may sound odd, but the food base is best determined by the animal. Like people, animals have different metabolic rates and therefore different food needs within the species. The keeper determines quality and type of food. The animal's interest in the food (or lack of it), and in doing what is necessary to obtain it, will tell the keeper if too much food or too little is being offered on a daily basis. This same principle applies to an animal in the wild. An animal would not normally expend energy to hunt or forage if it was not motivated to do so by the need to eat. In a positive reward system, based on food reinforcement, either preferred "treat" food or a food drive must be established with the subject animal. To save time, this process can actually be accomplished while establishing the bridging stimulus.

Once a food delivery system, (which minimizes any potential risk to the keeper) has been established for the particular species, conditioning can begin.

A bridging stimulus bridges the gap between the time the animal performs a behavior and the delivery of reinforcement. The "bridge" is a critical component in the operant conditioning process, it gives important information to the animal about what will be reinforced. Conditioning a bridging stimulus is a simple procedure. Begin by pairing any consistent sounding noise, (clicker, whistle, etc.) with food. The noise is to be sounded just prior to the offering of food. Your consistency and timing (latency) are two important keys as you pair the sound with the food. Very quickly (in most species this happens within a few sessions), the animal will begin to associate the sound with the offering of food, something it desires.

To test the animal's progress toward auditory conditioning, sound the bridging stimulus and wait a few moments before the food is offered. The animal's anticipatory behavior (or lack of it) will tell you if conditioning has taken place. Be sure the animal is responding only to the sound of the bridge and not your body language or movement prior to the bridge.

TECHNIQUE: SHAPING BEHAVIOR: TARGET TOUCHING

Almost all higher animals are capable of learning several components of behavior simultaneously. At the same time the bridging stimulus is being conditioned, most animals can learn to target touch in exchange for a food reward.

Target touching in this training system is a very important first step. The shaping of just about every conceivable behavior in this system will have a common origin in the act of target touching. Once the animal is conditioned to touch the target, it can be directed from one place to another at will. Target touching is important too, in that it focuses the animal's attention and minimizes the impact of distractions. The target becomes a familiar and reinforcing object to the animal and soon holds the power to offer reassurance when new training situations arise and the animal is unsure of what is expected. The target is a reference point.

The first step in the process is to systematically desensitize the animal to any fear of the target (a novel stimulus). The animal should be reinforced for a relaxed awareness of the target in its immediate area. Always take the opportunity to reinforce the animal for noticing or investigating the target. Remember, the ultimate goal is to encourage the animal to move toward the target, so you must use your food reinforcers to encourage the animal to do so. This is the essence of the shaping process. Shaping consists of taking a very small tendency in the right direction and shifting it, one small step at a time, toward an ultimate goal.

Some of the more timid animals (especially prey animals) may not initially be brave enough to want to investigate the target. In these cases, it may be necessary at first to bring the target to the animal. The animal's behavior will indicate when it is comfortable enough with the target for you to move to this next level.

Always try to touch the animal on the head so it sees the approach of the target and is not startled. The bridging stimulus should be sounded at the exact instant that the animal is actually touched on the nose or face by the target. By pairing target touching with a food reward, a positive association is soon made. Be careful not to stay at this level too long. The animal must learn to touch the target on its own and not wait for the trainer's manipulation. By trying to do too much for the animal, the trainer runs the risk of unintentionally conditioning the animal to stand still and wait.

Trainers should always capitalize on opportunities to reinforce the animal for thinking. Well-trained animals, fluent in the language of operant conditioning, have also learned how to put complex components of behavior together. These animals have in effect "learned how to learn". Shaping the animal's understanding of this learning process is where a trainer's skill really shows.

Training is creative work.

TECHNIQUE: SYSTEMATIC DESENSITIZATION BEHAVIOR: VOLUNTARY BLOOD COLLECTION

As the phrase implies, systematic desensitization is the process where a stimulus, through exposure, loses its influence on the behavior of an animal.

In animal training, desensitization refers to a systematic series of reinforcements selected so as to reward an animal for ignoring a specific stimulus, (usually a noxious or mildly aversive stimulus such as venipuncture for injections or blood withdrawal). Desensitization is a critical tool in the training process. In the wild, most new situations that confront an animal are treated with caution. Captive exotics, though removed from the wild, are genetically predisposed to respond the same way as their wild counterparts. A trainer must use his/her reinforcements to desensitize the animal to the novelty of every new situation.

Venipuncture for blood withdrawal is a common husbandry training problem. Training an animal is always easier if the animal has no previous negative history associated with the desired behavior. If the animal does have a conditioning history with aversive associations, each of these associations must be identified and then neutralized through desensitization. The sight of veterinarians, white lab jackets, special equipment, the smell or feel of alcohol - each of these events could be recognized by the animal as a precursor to a negative event and therefore must be desensitized.

In any event, the first rewards are given as the animal simply relaxes its body posture. Only after the animal is totally relaxed with each stage does the trainer proceed on to the next new stage. Determine the optimum site for blood withdrawal and begin to reinforce the animal for allowing access to the general region. Begin to focus attention on the specific area where vessels are close to the surface. Desensitizing the animal to the smell and feel of cool alcohol can be done at the same time increased blunt pressure with a thumb is being applied to the region. Again, the animal is reinforced only for relaxation or non-responses to the sensation of pressure being applied and the evaporation of the alcohol on the skin.

Once the animal willingly tolerates the application of pressure and alcohol without response, it is ready for the final phase where a mildly painful stimulus is introduced. Only those relaxed responses are reinforced. Tolerance is gradually established within the paradigm of relaxation. Some trainers use the edge of a fingernail to simulate the prick of a needle while others prefer the snap of a rubber band. The end result should be the same... a willing tolerance to a minor level of pain in exchange for a food or social reward.

TRAINING ANIMALS TO SEPARATE FROM THE GROUP

We have the need to separate individual elephants from the herd for training while other members of the herd cooperate by remaining on station and waiting their turn. When dealing with animals having social systems based on dominance, you can expect that the dominant animal will soon assert its position in the herd to get what it wants. Training is a very reinforcing activity. It is logical to assume that the dominant animal will soon use his/her position in an attempt to subordinate all others, so as to participate in every training session - not just the ones where he/she is wanted. Allowing this to occur only works well, however, in a herd of one. So how do we deal with this eventuality?

The key in moving an animal from one location to another, under stimulus control, involves the animal learning, through trial and success, which place is the most reinforcing place to be and when. The trainer helps speed this learning process in two ways. First, a station or mark is established where the animal can expect reinforcement. Second, the trainer establishes specific parameters that never vary as to when the animal is to move from the station to another location for reinforcement.

While the animal is on station, under stimulus control, it can expect periodic reinforcement for remaining. When the animal is sent to another location, all reinforcement at position "A" stops. Only position "B" is now reinforced.

In separating an animal from a group, the trainer builds on the simple strategy described above. Before we can begin separating one animal from another for training, both animals must first be proficient at single A to B separations.

Through advance planning, we establish the highest probability for success by beginning the process with two animals that are already known to be compatible with one another. These animals will be less likely to dominate or displace one another over the delivery of food reinforcers or opportunities for training.

Once these animals understand the separation system and are functioning as a team without antagonism, a third animal, already team separation trained with another compatible partner, is added to form a triad. The same process is repeated and expanded upon until all separation requirements for the herd are met.

In separation training, both locations (A and B) must be neutral to the animal. Reinforcement comes only when the established rules are adhered to. In the functioning system, the animal's physical location, except as required by the trainer, is irrelevant. If one location has a greater attraction through conditioning than another, the animal will discriminate against the location with the poorest reinforcement history.

In managing the herd, we will divide the animals into smaller workable units by using several different stationing areas. We will also rely on our understanding of current herd dynamics to insure the safest most effective method of separating animals out from the herd for training, with their voluntary cooperation.

A GLOSSARY OF TRAINING TERMS

ADAPTATION Adjustment to new surroundings; characterized by a decrease in excitability.

ANXIETY A descriptive term which refers to changes in behavior produced by the onset of an aversive or pre-aversive stimulus.

APPROXIMATION The reinforcement of partial or preliminary responses, in a step by step fashion, gradually progressing to closer and closer to the final form of a behavior.

AVERSION A dislike or avoidance of something.

AVERSIVE STIMULUS A noxious or unpleasant situation which has the effect of increasing the frequency of some behaviors (negative reinforcement) and decreasing the frequency of other behaviors (punishment).

AVOIDANCE BEHAVIOR Behavior which increases in frequency because it postpones the onset of an aversive stimulus, (and is thus negatively reinforced).

BEHAVIOR A broad term to indicate all the responses, overt or implicit, muscular or glandular, of an organism.

BEHAVIOR MODIFICATION Refers to the differential reinforcement of successive approximations leading toward a target behavior pattern (see approximation).

BRIDGING STIMULUS A stimulus which signals the delivery of a reinforcer. Often called conditioned reinforcer, because it acquires its effectiveness through a history of being paired with primary reinforcement. It permits instantaneous reinforcement after a response.

CLASSICAL CONDITIONING A cause and effect event where the stimulus is an adequate explanation for the response. The response is elicited reflexively. The animal exercises no control in the situation and the animal's action produces little or no change in its environment.

CHAINING The process of learning a sequence of behaviors that proceeds in a predetermined order. A chain consists of two or more behaviors linked by a common stimulus. The characteristics of a chain of behaviors are: one signal (Sd) cues the entire chain; the behaviors always occur in the same order; each behavior in the chain must be successfully completed for the next behavior to occur; a single bridge (conditioned reinforcer) terminates the entire chain.

CONDITIONING The process by which a behavior is made stronger (increasing the probability of its recurrence in a similar situation) by following the correct response with a reinforcer.

CONDITIONED RESPONSE A new or modified response that is elicited only by a given stimulus after conditioning has occurred.

CONDITIONED REINFORCER A previously neutral stimulus which has become reinforcing because of its association with a primary reinforcer. Also known as a Bridge. Crs are trained by presenting just before delivery of primary reinforcement.

CONDITIONING Conditioning refers to a change in the frequency and form of a behavior due to influences of the environment. It can be brought about by the application of reinforcers or punishers.

CONTINUOUS REINFORCEMENT A schedule of reinforcement in which each correct response is followed by a primary reinforcer. This schedule can sometimes produce frustration and/or aggression, in the event of non reinforcement.

DEPRIVATION Occurs when a primary reinforcer or strongly conditioned secondary reinforcer is withheld for a period of time.

DIFFERENTIAL REINFORCEMENT The selective reinforcement of one aspect of a behavior pattern to the exclusion of other aspects.

DISCRIMINATIVE STIMULUS (S^d) A stimulus which consistently elicits a particular response because previous experience with the stimulus has led to reinforcement. Unless a differential response can be shown, the stimulus is not an S^d .

DISCRIMINATION The ability of an animal to distinguish and respond to differences in various aspects of its environment.

DISPLACEMENT ACTIVITY An indicator of a state of conflict existing in an animal. An animal having difficulty with conflict resolution will often perform a trivial or abbreviated action in an attempt to break the stalemate in which it finds itself.

EXTINCTION The process of presenting the conditioned stimulus unaccompanied by the usual reinforcement, which results in a gradual decline in the performance of the behavior to zero.

EXTINCTION BURST A increase in responses or performance which is brought about by the withdrawal of reinforcement. The product of frustration, extinction bursts sometimes (but not always) occur just prior to the decline of behavior (due to lack of reinforcement) prior to extinction.

ELICIT To draw a response out. A trainer elicits a response from an animal.

EMIT To send out. An animal emits a response to a stimulus.

FADING PROCEDURE A technique for gradually changing one stimulus controlling an animal's behavior to another stimulus.

FIXED-INTERVAL SCHEDULE OF REINFORCEMENT A schedule in which reinforcement occurs for the first correct response after a set amount of time has passed following the preceding reinforcement. This schedule of reinforcement produces a scalloped response curve and is a poor motivator.

FIXED-RATIO SCHEDULE OF REINFORCEMENT A schedule in which reinforcement occurs regularly. Example: In a schedule FI 3, reinforcement would occur after every third correct response.

GENERALIZATION The mutation of discriminative stimulus, during which the animal will increase the strength of responses to various stimuli. An adaptive learning process. To the extent that stimuli generalization occurs, stimulus control is lost.

INCOMPATIBLE BEHAVIOR One behavior is said to be incompatible with another when it is impossible for both behaviors to occur at the same time.

INTERMITTENT / PARTIAL REINFORCEMENT Any schedule of reinforcement which provides reinforcement for only a percentage of correct responses, rather than for each one, as in continuous reinforcement.

INTERVAL SCHEDULE OF REINFORCEMENT Reinforcement based on the passage of time.

LATENCY The time between a signal (S^I) and the animal's response to it (the performance of a behavior).

LEARNING A relatively permanent change in response patterns which occurs as a result of reinforced practice.

MAGNITUDE OF REINFORCEMENT Refers to the size, strength or duration of a reward following a behavior.

MOTIVATION The non-stimulus variables controlling behavior; the general name for the fact that an organism's acts are partly determined in direction and strength by its own nature and/or internal state.

NEGATIVE REINFORCEMENT An animal is said to be negatively reinforced when the performance of a behavior serves to terminate or avoid an aversive stimulus or event. Negative reinforcement has occurred when the frequency of a behavior increases to avoid the onset of, or to terminate, an aversive stimulus.

OPERANT Operating or producing an effect or effects on the environment.

OPERANT CONDITIONING Is the term used for the procedure of presenting an organism with a reinforcing or aversive stimulus immediately following the occurrence of a response. In this method of conditioning, an animal obtains reinforcement or avoids an aversive stimulus by operating on the environment in some fashion.

PARADIGM A pattern, example, or model.

PROBABILITY The likelihood that a given behavior will occur.

PERFORMANCE A measure of observed behavior, it is generally referred to as the form and frequency of behavior.

POSITIVE REINFORCEMENT A favorable event that strengthens the response which precedes it. There are two types of positive reinforcement, primary (unconditioned) and secondary (conditioned).

PRIMARY REINFORCER An unconditioned reinforcer. Anything of intrinsic value to an organism, examples are biological needs for food, water, sex, or social needs.

PUNISHMENT Occurs when the frequency of a behavior declines due to the onset of an aversive stimulus immediately following its performance.

REGRESSION An animal is said to have regressed when its previously conditioned behavior has dropped back to a lower stage of development.

REINFORCER OR REINFORCEMENT The strengthening of something by adding to it; or that which strengthens, when added. Any condition or the total circumstances that strengthen a stimulus-response connection; any circumstances or event that increases the probability that a response will occur again in a situation like that in which the reinforcing condition originally occurred. Generally, any condition strengthening learning.

REINFORCEMENT STIMULUS Any stimulus which, when presented immediately following a response, tends to increase the frequency of the response.

RESPONSE An identifiable unit of behavior, (can be muscle movement or a gland).

REWARD A satisfaction-yielding stimulus or stimulus object that is obtained upon the successful performance of a task (see reinforcer).

REPERTOIRE The term repertoire is used to indicate the total number of potential responses which the organism may emit under the various conditions present in its environment and as a result of its past conditioning history.

SATIATION Satiation occurs when a normally positive stimulus is repeatedly offered until it loses its reinforcing properties.

SCHEDULE OF REINFORCEMENT Refers to the conditions under which reinforcement is delivered. Continuous reinforcement and variable reinforcement are the schedules most important to animal training.

SECONDARY REINFORCER A stimulus which becomes reinforcing through experience. Tactile reinforcement and play are examples. It is sometimes necessary to initially use primary reinforcement to shape an animal's behavior in such a way that secondary reinforcers may be applied and become accepted (reinforcing).

SHAPING The differential reinforcement of successive approximations of a desired behavior in order to increase the probability of the occurrence of a response and the probability of that response moving closer to a desired (target) behavior.

STIMULUS An external or internal object or event which occasions an alteration in the behavior of the organism. An animal must be able to perceive the stimulus.

STIMULUS CONTROL A different form or frequency of behavior in the presence of one stimulus (S^d) which does not occur in the presence of other stimuli.

SUPERSTITIOUS BEHAVIOR Behaviors offered by an animal which are not required for reinforcement, but none the less, become an integral part of the response pattern. Often caused by inadvertent or accidental reinforcement.

SUCCESSIVE APPROXIMATION The stair step process where behavior is made to approach a desired act by means of selectively reinforcing those behaviors which lead towards the desired act.

SYSTEMATIC DESENSITIZATION A procedure by which an animal is allowed to gradually become comfortable with an unusual or frightening stimulus.

TIME OUT Withholding all reinforcement including personal contact with the intent of extinguishing an undesirable behavior.

THRESHOLD The point at which a stimulus is just strong enough to be perceived or produce a response.

VARIABLE RATIO REINFORCEMENT SCHEDULE A schedule in which reinforcement occurs irregularly after a number of responses. This is similar to reinforcement schedules found in nature. An organism is not usually reinforced 100% of the time in nature even though it may have performed correctly those behaviors that usually lead to reinforcement. The most commonly used and effective schedule of reinforcement in animal training.

SOCIAL CONCERNS REGARDING PROTECTED CONTACT ELEPHANT MANAGEMENT

Just like introductions with other remotely managed species, we will accomplish introductions by using small holding pens, proximity to other animals in the herd, and the behavior modification technique known as systematic desensitization. Systematic desensitization is a procedure by which an animal is allowed to gradually become comfortable with an unusual or frightening stimulus.

To prevent animals from fighting, keepers managing multiple elephants in free contact rely on their relationship with and understanding of the animals, their dominance position within the group, and conditioning associated with their voices. Should a fight between two

animals actually begin, it would be foolish for a keeper to insert himself/herself between the animals. Proactively dealing with aggression before it happens is the better strategy.

Occasional displays of aggression are a by-product of the elephant's social behavior, helping to establish and maintain the dominance hierarchy for herd stability and security. Aggressive interactions are always a possibility, regardless of the training system being used.

Although aggressive behavior appears to be pre-programmed into an animal's genetic make-up, its expression in adult animals varies considerably in both quality and quantity. The effective use of aggression is a learned behavior. Therefore, mitigating aggression before it occurs should be a top management priority. There are two primary strategies for preventing aggressive behavior between animals. They are: differential reinforcement of behaviors incompatible with aggression, and differential reinforcement of other behaviors. Keepers using food rewards are also able to reinforce cooperative or affiliative interactions between members of the herd. Elephants quickly learn that only cooperative interactions are reinforced, so the probability of aggression will be reduced.

No system for managing aggression can be fail-safe. Sometimes other drives (i.e. sex or dominance) overpower the immediate value of any reinforcement strategy. Because of this, it is important to simultaneously employ several other strategies to deal with aggression. Other strategies to defuse aggressive behavior include; increased behavioral opportunities (training time), increasing the complexity in the elephant's environment, and developing random scatter/feed strategies that will encourage animal movement and utilization of the entire exhibit. The idea is to reduce the elephant's focus on each other and therefore the likelihood of aggressive interactions between them.

CONCLUSION

Our world is constantly changing, as are our approaches to the husbandry of elephants in captivity. But our commitment to animals under our care should never change. The Riverbanks Zoo has chosen to maintain its elephants in a protected contact system and is dedicated to providing the very best level of care possible. By remaining open to new ideas that offer the promise of improving techniques for the care of our animals, we simultaneously work to provide a more secure future for them in a rapidly changing world.

Guidelines to Promote Safety while Working With Riverbanks Zoo's Elephant Herd

Introduction: The Riverbanks Zoo's elephant herd is maintained in protected contact where all of the medical and husbandry behaviors are maintained without sharing the same enclosure with the animal. These behaviors are conditioned where the animal presents a specified body part near or through the barrier to accomplish the desired objective. The protective barrier should never be considered as the only measure that prevents an elephant from causing injury to a keeper. Instead, it is the position of the trainer in relation to the barrier and the animal that ensures their safety. This document was generated to inform the trainer on how this can be accomplished while performing necessary husbandry and medical procedures. Many of the daily behaviors can be accomplished without a trainer being in a vulnerable location in relation to the animal's head, trunk and feet. However, there are some behaviors such as, TB trunk wash, tusk socket flush and front foot care where the trainers must position themselves in potentially dangerous location. This document will address each one of these specifically to ensure that they are carried out as safely as possible.

I. General Guidelines:

- All aggressive responses elicited by an elephant towards a trainer must be reported to Elephant Supervisor as soon as possible.
- It is of utmost importance that the trainer remains focused while working with an elephant. If distractions occur that threatens this focus, the session should be ended immediately.
- All exhibit barriers must be thoroughly inspected before shifting the animals into the outdoor enclosures.
- Conversations on the radio or from co-workers during a training session should be avoided and cell phone use is prohibited.
- A minimum of two animal keepers must be present in the elephant barn when training, feeding or shifting an elephant.
- The animal's attitude and behavioral thresholds should continuously be monitored.
- Trainers should never stand directly in front of unprotected locations (keeper stall entrances or areas without strike chains) when elephant is front facing.

- Trainers should never place their arms between the barrier and the animal during physical exams, tactile desensitization or delivering tactile reinforcers.
- Reinforcers should be delivered on the ground unless behavior requires a different location. The exceptions are oral exam, TB trunk wash and tusk socket flush.

II. Public Demonstration and P.M. Shifting;

- Reinforcers should only be delivered on the ground.
- The animal will only be trained utilizing NO CONTACT.
- Trainers must remain a trunk's distance from the elephant.

III. Tusk Socket Flushes;

- The elephant's trunk should be in the upright position before approaching the barrier.
- Trainers should never stand directly underneath the trunk while it is in the upright position.
- Trainers should position themselves so that a barrier pole is between them and the animal.
- Once flush procedure is complete, trainers should move to a safe distance before releasing the trunk from the upright position.
- Food reinforcers can be tossed directly into the elephant's mouth keeping hands from passing through the barrier.

IV. Oral Exams;

- The elephant's trunk should be in the upright position before approaching the barrier.
- Trainers should never stand directly underneath the trunk while it is in the upright position.
- Trainers should position themselves so that a barrier pole is between them and the animal.
- Once procedure is completed, trainers should move to a safe distance before releasing the trunk from the upright position.
- Food reinforcers can be tossed directly into the elephant's mouth keeping hands from passing through the barrier.

V. Front Footcare and radiographs;

- Procedure will only be performed utilizing two qualified elephant keepers. One is assigned to foot trimming nail filing or x-ray plate positioning. The other will be positioning the elephant, delivering reinforcers and monitoring the animal's attitude.

- Procedure will only be performed in locations with strike chains or mesh barrier.

VI. TB Trunk wash;

- Trainers should position themselves so that a barrier pole is between them and the animal.
- Trainers should never stand directly underneath the trunk while it is in the upright position.
- Food reinforcers can be delivered to the elephant's trunk.

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1/21/2003

updated 07/09/2003

John Davis

Riverbanks Zoo guidelines for Training Elephant Keepers

Incorporating a keeper into the elephant program entails several components. First, the new keeper must learn the operation of the facility, including hydraulic door and ERD operation. Second, they must be confident with the proper signals and cues, which is vital to eliciting the appropriate animal behaviors. Third, they must also have a good understanding of proper reinforcement schedules to maintain the behaviors reliably, and be able to perform them following the elephant safety guidelines. Becoming a confident trainer begins with learning operant conditioning principles and techniques. The new keeper must attend the behavior modification course offered by the zoo as soon as possible. The course is offered bi-annually. Once the operation of the facility is explained and demonstrated, the new keeper can begin operating doors during animal shifting to and from the exhibit. During the shifting procedure there is a qualified keeper available to assist if necessary. A map of the facility and doors is posted at each door operating station. Operating doors is an ideal starting point for the new keeper, giving them the opportunity to observe the methods in which the animals are transferred to participate during A to B shifting. Also, the animals are introduced to the new keeper in a non-threatening role.

All of the conditioned behaviors are signaled using verbal, hand and/or body position signals presented to the animal by the trainer. It is important for the new keeper to become well versed with all of the cues in order to produce reliable behaviors from the animal. Observing qualified trainers during a training session and asking questions after the session is advised. Also, the elephant supervisor will provide explanation during demonstrations. Improper use of signals during a training session is a common error among new trainers, causing the animal confusion and anxiety. This is highly counterproductive when establishing a working relationship with the animals and should be avoided. The elephant supervisor will demonstrate some non-aversive behaviors to start with, such as, body presentations and reporting to a station. The behavior coordinator will assess the efficiency of signals and cues and monitor the animal's behavior while the keeper trainee is involved in a session with the animal. The rate at which these behaviors are added to the new keeper's sessions is dependent upon the animal's attitude and focus towards the new keeper as well as the keepers understanding of proper behavioral cues and the timing of reinforcement. These will all be assessed and monitored by the elephant supervisor.

The primary objective during the training process is to have the new keeper introduced to the animal in a highly reinforcing role without introducing anxiety or engaging in any potentially aversive behaviors, such as blood draw or foot care. This is accomplished by involving the new keeper in as many highly reinforcing, non-aversive behaviors and tasks as possible. Tasks such as, feeding am and pm grain, distributing pm hay, and performing non-threatening behaviors over several weeks will build this highly reinforcing role. Once this

relationship is accomplished introducing behaviors that are potentially aversive or threatening can be added using the desensitization procedure.

Non- threatening Behaviors

- "Come" --Report to the trainer at a specified station
- " Back" --Back away from the barrier
- "Lean-in" --Position body parallel to the barrier with sides touching the barrier poles.
- "Turn" --Turn away from the trainer and barrier. Performed after lean-in position.
- " Trunk"-- Raise trunk above head, curling the end back towards the animal's forehead.
- "Ears" --Extend both ears forward while facing the trainer
- "Line" --Animal is facing the trainer, perpendicular to the barrier.
- "Foot" --Lift specific foot

Threatening or potentially aversive Behaviors or Tasks

- Blood draw or injections
- Foot care
- TB trunk wash
- Rectal or vaginal palpation
- Eye, ear and tusk socket exams
- Foot x-ray
- Shaping new behaviors
- "Stretch" or "Down" --Animal lays in a sternal position.

Understanding Aggressive Responses and resolving their elicitation

Anxiety is the underlying motivation that usually elicits aggressive responses from an animal towards a trainer. The origin of anxiety is generated by environmental and external stimuli or internal factors induced by the trainer during a session. External stimuli are factors that are distractions from other animals and, non-routine noises (trucks, airplanes etc). These anxiety-generated stimuli can be associated with the trainer's presence, resulting in displaced aggression towards the trainer. In the event an external stimulus that causing anxiety occurs during a session, the trainer should pause the session and resume once the animal's focus and attitude have returned to normal. Internal stimuli are factors, induced by the trainer, that are created by exceeding the animal's threshold during a session. The animal's threshold or level of understanding should always be monitored during a training session. This is accomplished through observation of the animal's attitude. Reading the elephant's attitude must be learned by the trainer and it is different for each animal. Indicators or pre-aggression behaviors to pay close attention to during a session are the eyes, ears and trunk. When a threshold is exceeded the eyes will often change from a passive appearance to a more focused, uneasy appearance. The ears can change their position from being relaxed against their head to extend forward. The trunk can change from a relaxed position on the

floor to reaching in the trainer's direction. Any changes in these indicators should warrant a change in the training plan by reducing the level of stimuli presented to the animal. If the stimulus presented to the animal continues at the same level, while ignoring the attitude changes, aggression will often be the next response. Most importantly, a change in attitude resulting from either external or internal stimuli should never be reinforced.

Reviewed 1-11-2007

Riverbanks Zoo and Garden Elephant Management Program

Mission Statement:

The Riverbanks Zoo and Garden elephant management program maintains its elephants in a manner that meets or exceeds the AZA standards for captive elephants. In so doing, we have committed to the conservation of elephants, public education and the empowerment of our staff to make a difference.

Goals:

- I. Provide for the social, psychological and physical needs of the African elephant herd through protected contact management program.**
- II. Develop a successful breeding program that complies with AZA elephant SSP.**
- III. Explore the conservation needs of elephants and participate in research supported by AZA.**
- IV. Provide public programs and demonstrations to educate zoo visitors about captive elephant management and the conservation needs of their wild counterparts.**