POSITIVE REINFORCEMENT TRAINING

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Positive reinforcement training is proving to be a successful method for modifying the behavior of many captive species, including orangutans. The range of useful applications made possible by using this technique is endless. This chapter supports positive reinforcement as the training method of choice for modifying the behavior of captive orangutans, and seeks to inspire orangutan caregivers to experiment with this training technique as a means for solving husbandry problems. The chapter focuses on practical information to guide orangutan caregivers though the process of implementing a training program and to help with problem solving. It also suggests ways to work as a team with coworkers and lists some ideas for using positive reinforcement training with captive orangutans.

Training animals can be one of the most gratifying or frustrating experiences for orangutan caregivers. How is it that some orangutans are capable of consistently learning and executing seemingly advanced behaviors, such as giving blood samples, allowing injections, and displaying complex chains of material behaviors, while other orangutans refuse to walk from cage A to cage B? Many of the animals exhibiting these behavioral extremes live in the same facility and are cared for by the same staff members.

An individual animal's temperament plays a definite role in its response to training, but success is more likely dependent on the thought and planning that goes into the program. Often, an everyday occurrence such as moving an orangutan from one cage to another is not given the attention paid to training more complex behaviors. Successful behavior modification hinges on a focused effort as well as on *consistent* handling of the animal by caregivers, clear training goals, *support* and guidance for the program from supervisory staff*, sensitivity* to each animal's specific needs, and determination of the individual animal's motivation for both desired and undesired behaviors.

WHY CHOOSE POSITIVE REINFORCEMENT TRAINING?

There are many ways of modifying behavior. How do you choose the most effective method for the animals in your facility? Reading about and understanding conditioning theory is a good place to start. Whether you intend to or not, you are training the animals you care for on a daily basis. The more you understand about the forces that influence behavior, the better equipped you will be to understand how your

actions affect their behavior. As you understand *your* role in *their* behavior, some of those bewildering behaviors can begin to make sense.

Positive reinforcement and negative reinforcement are the two most commonly used training techniques. "Positive reinforcement is anything which, occurring in conjunction with an act, tends to increase the probability that the act will occur again" (Pryor 1984). Positive reinforcement is something the subject wants and will work to obtain. "Negative reinforcement is something a subject will work to avoid" (Pryor 1984). With negative reinforcement training, an animal will modify its own behavior to avoid an aversive stimulus.

Negative reinforcement is very different from punishment, however. "Punishment comes after the behavior it is meant to affect. Thus you can't avoid receiving a punishment by changing your mind, or your actions, since the misbehavior has already happened." (Pryor 1984) Punishments are meant to "teach the subject a lesson," but are delivered too late to have much impact on future behavior.

The following examples illustrate how each method might be used to move an orangutan from cage A to cage B:

> A caregiver gives the orangutan access from cage A to cage B, which contains a variety of foods. The orangutan is hungry, he wants the food, and moves into cage B to get it. His desire for food has motivated him to move. Obtaining the food is positive reinforcing for this animal. Because it is reinforcing, the desired behavior, moving from cage A to cage B, is more likely to be repeated in the future.
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> A caregiver may also succeed in moving the same animal by hosing it with water, a stimulus the animal wants to avoid. The desire to avoid the water, the negative stimulus, motivates the animal to move to the next cage. The ability to avoid this negative stimulus is reinforcing for the animal and the desired behavior, moving from cage A to cage B, is therefore more likely to be repeated the next time this animal sees the stream of water. Since many orangutans play with water, it is important that the negative reinforcement be truly negative for this method to be effective.

Both negative and positive reinforcement can successfully modify and *increase* behavior. Although negative reinforcement is a useful tool, and in some cases may achieve the desired result more quickly than positive reinforcement, it can be difficult to regulate and implement. Animals may become desensitized to the negative stimulus, which requires

increasing the intensity of stimulus to achieve the same result. The animal may also associate the negative stimulus with the person delivering that stimulus, which can harm the caregiver's rapport with the animal.

Through our own experience, as well as the experience of other institutions around the country, we have seen that positive reinforcement is an effective way to modify behavior while cultivating a positive relationship between the animal and the caregiver. Positive reinforcement training can be used to overcome behavioral or medical problems that have been difficult to solve using traditional methods. Although formal training programs require a great deal of thought, planning, and training time, they generally prove to be worth the investment. Due to the limited physical access a caregiver has with an adult orangutan, gaining the cooperation of the animal using positive reinforcement enables a caregiver to train more behaviors effectively. By teaching animals to cooperate in their own care through training, caregivers can broaden the scope of care they are able to provide without sedation or restraint.

Additional benefits may be derived from positive reinforcement training as well. When a caregiver and an animal interact during a training session, an intense two-way communication takes place. This communication, as well as focused or devoted time spent together, fosters a trusting relationship between the animal and caregiver. Animals respond favorably to the mental stimulation, attention, behavioral enrichment, and other rewards they receive during their training sessions. Because this method has been used to modify behavior so successfully, it is the one we recommend and will focus on in this chapter.

DAILY MANAGEMENT

Caregivers, some without knowing, already use positive reinforcement techniques to motivate the animals they work with during their daily routine. Orangutans respond well to food or enrichment devices such as motivation for moving on and off exhibit or from one cage to another. Animals will usually come up to the cage front and allow a close visual exam for a favorite food item. These positive re-enforcers have been used effectively with captive orangutans for years.

More recently, orangutans have been trained using positive reinforcement to executive very complex husbandry behaviors. Formal training programs using positive reinforcement have proven to be a very successful and progressive way to tackle a variety of medical and behavioral challenges facing caregivers of captive orangutans. The following are behaviors which have been successfully trained with

orangutans living in zoos in the United States by using positive reinforcement training:

- Voluntary separation of animals in a group
- Moving from cage A to cage B
- Presentation of specific body parts for examination (i.e. back, stomach, hands, feet, throat sac, head, ears, mouth, eyes, tongue, teeth, genitals)
- Nail trimming
- Temperature to be taken with a tympanic membrane thermometer/rectal thermometer
- Anal, vaginal, nasal, and throat swabs
- Injections
- Blood draws
- Finger prick for blood
- Fecal specimen collection
- Semen specimen
- Urine specimen
- Swab throat sac/air sac washes
- Maternal/paternal skills training for nulliparous or less than competent dams
- Mother presents surrogate infant to caregiver for bottle feeding through the cage front
- Mother positions surrogate infant to her nipple
- Mother holds and carries surrogate infant
- Chest x-rays for TB screening

Because training these behaviors requires a great deal of time, effort, and institutional support, each institution must weigh the cost verses the benefit. Consult the end of this chapter for the institutions and the people who were involved in the successful training programs listed above. Consider contacting them to determine the amount of time and effort training each behavior might require.

POSITIVE REINFORCEMENT TECHNIQUES – A BRIEF OVERVIEW

All of the techniques behind positive reinforcement training lead back to one basic principle*: the frequency of a desired behavior can be increased by positively reinforcing the occurrence of that behavior*. The reinforcement must be something the animal wants. It may be a tactile, verbal, or food reward or conspecific.

The timing of the delivery of reinforcement is crucial. It must immediately follow the desired behavior for the animal to make a connection

between the behavior and the reinforcement. Once the animal makes this connection, however, it will repeatedly display the behavior to earn additional reinforcement. If the reinforcement is delivered too late, the animal may associate it with a behavior other than the one the trainer was trying to reinforce.

Because it is not always possible to deliver a food or tactile reward immediately following the desired behavior, a "bridge," which may also be called a secondary reinforcer or conditioned reinforcer, is used to bridge the gap between the behavior and the actual reward. The bridge is usually a sound from a whistle, a clicker, or a word that tells the animal, "Yes, that's what I wanted you to do." This sound signals the animal that they have earned a tangible reward which will be delivered shortly. Use of a bridge allows a trainer to communicate more exactly the animal's action that is desirable and is being reinforced.

During the training session it is important to vary how often the tangible reinforcement is given. When an animal is first learning behavior or an approximation of a behavior, a reinforcer should be given for each correct response to communicate that this is indeed the behavior that is earning them reinforcement. Once the animal consistently responds correctly and the trainer feels certain the animal has learned the behavior, it is more effective to reinforce the behavior randomly. When using a random or variable schedule of reinforcement, the trainer gives the animal a tangible reward after a variable number of correct responses. This random schedule of reinforcement strengthens the desired behavior. This is often a hard concept for trainers to understand at first. Isn't a reward for every correct response, a fixed schedule of reinforcement, better than a reward for every two or three correct responses? Actually, when an animal receives a reward on a fixed schedule, the pattern becomes so predictable that the animal tends to lose interest over time. An unpredictable reward schedule helps keep the animal interested in the training. Gambling is the classic example used to illustrate this point. It is the hope of winning the jackpot that keeps the gambler's attention.

Variation in any aspect of the training session also serves to hold the animal's interest. Making some sessions long, some short, some easy and fun, some more challenging, and training in a different cage or location in the same cage, are all good ways to add variety.

The size or magnitude of the reward should vary, too. More difficult behaviors deserve rewards that are perceived by the animal to have greater value. The animal should be adequately compensated for its efforts and achievements. If an animal receives the same magnitude of reward for opening its mouth as it receives for allowing an injection, the animal may become reluctant to allow the injection. It no longer "pays"

for the animal to allow the injection if it can earn the same reward by opening its mouth.

Behaviors can be taught either by "capturing" the spontaneous occurrence of one that is already present in the animal's behavioral repertoire, or by "shaping" a new behavior. Capturing a behavior is the process of repeatedly pairing an existing behavior with a reward. For example, if a trainer decides to train an orangutan to take a drink of water on command by capturing the behavior the trainer would watch the animal, wait until it took a drink, then quickly sound the bridge and give the animal food reinforcement. After many repetitions of receiving food after taking a drink, the orangutan will begin to associate its action of drinking with receiving a reward. Soon the animal will begin taking many drinks in order to earn rewards. It is difficult to capture spontaneous behaviors unless they occur frequently when the trainer is present. If the trainer rarely sees the orangutan drinking, there will be little opportunity to reinforce the behavior. As a result it may take a long time for the orangutan to make the connection between its drinking behavior and the reinforcement.

Shaping involves molding a desired behavior by training small sequential steps that progressively approximate the behavior until the final behavior has been realized. Shaping is usually necessary to train complex behaviors or behaviors that don't occur frequently. Shaping would be necessary in the above example of training an orangutan to take a drink if the animal rarely drinks when the trainer is present. The trainer then needs to shape the behavior through a series of small steps that approximate the drinking behavior rather than just rewarding it when it occurs. These small steps might involve reinforcing the animal for sitting near the water source, then for leaning towards the water source, then for putting its lips to the water source, and finally for drinking. More detailed examples of shaping will be described later in this chapter. It may take longer to shape a behavior than to capture one that occurs frequently. Because it's easier to shape an animal's behavior in a series of small steps, it is easier to retrace these steps if the animal discontinues the behavior. If the animal stops drinking on command, the trainer is able to go back and retrain the steps previously used to train the behavior. This is one advantage shaping has over capturing a behavior.

Once the trainer is certain that the animal is purposely drinking to earn reinforcement, the trainer can put the behavior on a command or "cue," which enables the trainer to request the animal to display the behavior at any particular time. To establish a cue, the trainer precedes the desired behavior with a voice command or hand signal and only reinforces the animal for displaying the desired behavior when it occurs after that cue. For example, to establish a cue for the trained drinking behavior the

trainer would, upon seeing the animal moving toward the water source for a drink, quickly clap his hands and say the word drink, the cue he has chosen for this behavior. After many repetitions of preceding the behavior with the cue, the orangutan will associate the clap and words with being reinforced for taking a drink, and will begin to offer the behavior after this cue. While training the cue, the trainer should no longer reinforce the behavior unless it follows the cue. As more behaviors are trained, the animal is required to discriminate between the different behaviors it has learned. The cue is the trainer's signal to the animal that he is requesting a behavior, as well as which behavior he is requesting.

Reading some literature on conditioning is recommended before embarking on a complex training program. Two of the most useful resources have been the books *Don't Shoot the Dog* (Pryor 1984) and Animal Training, Successful Animal Training Through Positive Reinforcement (Ramirez 1999). Both of these books have a tremendous amount of information and are great references. The following are a few of the main principles of positive reinforcement training to remember:

1. The frequency of a desired behavior can be increased by positively reinforcing that behavior
2. The reinforcement must coincide with the desired behavior
3. Once a behavior has been shaped or modified and the animal consistently responds, rewards should be given on a variable schedule of reinforcement
4. More difficult behaviors deserve larger rewards
5. Behaviors can be captured or shaped
6. The last step in training a behavior is to put the behavior on a cue

HOW TO BEGIN?

Aside from understanding basic techniques, here are some important steps to follow before actually beginning a training program. First, decide on the behavior to be trained. If the behavior needs to be shaped, determine what steps might need to be trained to reach the final goal. Then, choose one caregiver to work with one orangutan throughout the process of training this behavior. The reason for this is that it is very difficult for different trainers to be consistent in their cues and signals. The learning process requires intense and clear communication between the animal and the trainer. Once the behavior has been learned, other trainers can be taught to ask the animal to repeat the behavior by carefully following the cues. It is permissible however, to have other trainers teaching different behaviors to the same animal concurrently.

Next, choose a word, a whistle, or a clicker to be the bridge. Each has its own advantage. The whistle leaves the trainer's hands free for holding

props or rewards. It is a sound that most orangutans aren't used to hearing so it can attract their attention and can be heard from a distance. With a little practice, a short toot can be delivered immediately following the behavior. The clicker is similar to the whistle but has the disadvantage of occupying a hand rather than the mouth.

The verbal bridge, such as the word "good," is the easiest to learn, but it can be harder to communicate exactly what you want with a verbal bridge. Initially, it may not stand out as a clear signal to orangutans because they are used to their caregivers talking to them. Some trainers feel most comfortable using a verbal bridge, though, and that can be a real advantage. Once the word is established as a bridge, it can be very effective. Be sure to not use this word casually once it becomes a bridge or it will lose its effectiveness. For all three methods, it takes practice getting the trainer's reaction time synchronized with the desired behavior to avoid late bridging.

Before a trainer can train any behaviors, they must first teach the animal that the sound of the bridge means that food or some other reward will follow soon. This is called establishing the bridge. To do this, the trainer sounds the whistle, word, or clicker and immediately feeds the animal a favored food item. Choose something the animal can consume quickly. This is especially important with orangutans, which tend to eat slowly and savor their favorite food items. Try using a variety of small fruit pieces as rewards, or sips of juice from a cup or spray bottle. Repeat this process until the animal, after hearing the bridge, anticipates getting a piece of food or a sip of juice. Work in an area where interaction can take place most easily and safely between the trainer and the animal.

Now try training a simple behavior. One of the easiest behaviors to teach to an orangutan is to touch an object. Pick any item (e.g., a spoon handle, a ball, a clip, etc.) and hold it within reach of the animal. Most orangutans are curious and will readily touch a novel object. Be sure to use items that cannot harm the animal in case the orangutan steals the object. If the animal is not responding, try touching the object to the animal's finger if you can reach it. Sound the bridge at the animal's first touch and give a food reward. Repeat this several times.

Next, move the object to a slightly different location and wait again. The animal will probably touch the object in moments wherever it is placed. If the animal does not respond, try another type of object or different, more attractive rewards. Very attractive rewards are sometimes used initially and can later be scaled down once the animal becomes accustomed to the training process and is comfortable interacting with its trainer. If the orangutan is touching the object aggressively, ignore this aggression. Everything is new to the animal at first and this unwanted behavior will probably disappear on its own. Try moving the

object far enough away so that it can only be touched lightly. Later, as the object is moved closer again and the animal is calmer, only bridge and reinforce non-aggressive touches.

Keep the sessions short, no more than 10 minutes long, and try to end them on a positive note. Orangutans seem to learn best during short frequent sessions in which they are encouraged to succeed.

LET'S TRAIN

Once you and the animal have experimented with training a bit you are ready to begin working toward whatever specific training goals have been identified. You are armed with a little experience and effective techniques, but how do you actually train that first step or any step? The following story may help you visualize the process.

Ben's Ear

Ben is a friendly and personable 14-year-old male orangutan. He is a great training candidate. He has had a number of training sessions with his trainer Helen and already knows how to touch a target placed at various spots at the cage front. When he hears the whistle bridge, he immediately stops what he is doing and waits for his reward. Ben is rarely aggressive and is eager to please. Helen has found a good comfortable spot for their training sessions. Ben's enclosure has an off-exhibit holding area where the cage mesh is 2"x2". Here, Helen can sit or stand close to Ben and know that he can't grab her. She can easily talk and gesture to Ben and feed him through the cage front out of public view. This makes Helen feel more relaxed and able to risk making mistakes, which she has found to be a common occurrence.

During training sessions, Helen has noticed that Ben will often rest his forehead against the cage front. After seeing this happen several times, Helen decided to try to *capture* this behavior. The next time Ben rested his head on the cage front Helen touched his forehead with her index finger and blew her whistle. Ben was a little startled at being touched but the whistle cued him to wait for his food, and he readily accepted his bite-sized piece of banana. Helen then asked Ben for a behavior he already knew, to touch the end of his target, a spoon handle. Helen rewarded Ben, and then waited for a bit. Lucky! Ben soon rested his head on the cage front again and Helen was able to touch his head and bridge Ben again. This time Ben was not startled by the touch, but he didn't seem to know why he was earning another piece of fruit, this time a grape. During their 10-minute session, Helen was able to reward Ben for resting his head on the cage front seven times. She ended the session not knowing what she would do with the behavior even if she was able to capture it, but felt a sense of accomplishment nonetheless. She wasn't sure, but she had the sense that Ben was resting his head against the

cage front more than he usually did. She noted this in the records she was keeping after each training session to chart her progress.

The following day, as soon as Helen came to the cage front with her training props and rewards, Ben put his head to the cage front. Delighted, Helen bridged and rewarded this behavior. Then, on a lark, she asked for this behavior again by putting her index finger to the cage front just to the side of where Ben was resting his head and said "head". Ben slid his head over to Helens finger and held it there until he heard the whistle blow. Helen gave Ben three large pieces of fruit to let him know how pleased she was that he had made the connection between the cue she had just introduced and the *head* behavior. By the end of the session, Ben would reliably press his head to the cage front wherever Helen placed her finger. Once Ben really knew the *head* behavior, Helen began asking him to present his head two or three times before delivering the reward. Putting the behavior on a variable reinforcement schedule is an important step in maintaining a trained behavior. Then it occurred to Helen that she might be able to *shape* this *head* behavior into Ben presenting his ear to the cage front, and eventually desensitize him to the feel of a tympanic membrane thermometer. The ability to take an animal's temperature could be a useful behavior in the future. Helen contemplated the best way to train this behavior. The most difficult part seemed to be how to get Ben to turn his head.

After talking with several other trainers, Helen wrote up a short list of steps that might help her shape the behavior.

1. Ben holds head at cage front and allows spoon handle to be placed against his cheek pad.
2. Move spoon handle away from cheek pad slightly and have Ben turn to touch cheek pad to the handle.
3. Touch cheek pad to the cage front rather than the handle.
4. Hold cheek pad at the cage front while spoon handle is placed on his ear.
5. Move handle away from ear slightly and have Ben turn to touch his ear to the handle.
6. Continue moving the handle slightly further away until Ben turns his ear to the cage front.
7. Hold ear at the cage front while various objects are placed against the ear. Desensitize Ben to the feel of the tympanic membrane thermometer.
8. Repeat 1-7 for the other ear.

The next session, Helen began working on Step 1. She cued Ben for the head behavior and had him hold that position for a few seconds before bridging him. She slowly lengthened this hold time to a count of five. Next, during the hold, she cautiously slipped the end of the spoon

handle through the bars until it touched Ben's cheek pad. The instant the spoon made contact with his skin, she blew her whistle. After several repetitions of this, Helen held the handle within a quarter of an inch of his cheek pad and waited. Ben, now anticipating the touch of the spoon, leaned toward it until his cheek pad touched the spoon! This was a major leap in understanding on Ben's part and Helen instantly bridged him and gave him a large reward. She tried this again but held the spoon half an inch away. Ben had understood! He quickly leaned into the spoon, turning his head in the process. Ben now knew that the spoon was where his cheek pad needed to be to win his prized fruit pieces. By the end of the seven-minute session, Ben was turning his cheek pad to touch the spoon held at the cage front and holding that position for a count of five. Helen could now see his ear behind that big cheek pad and looked forward to their next session. She sat with Ben for a few minutes after the session and hand fed him the rest of his training rewards.

In the following session, Helen placed the spoon handle at the cage front without using the cue for *head* first. Ben remembered and placed his cheek pad to the spoon. Great! Helen did not want to lose the *head* behavior though, so she continued to ask for *cheek pad* and *head* independently. Next, she transferred the cheek pad behavior to another hand cue so she could free up her spoon to reach his ear. She used her fist and held it at the cage front, said "cheek pad," and then held the spoon handle next to her fist. Ben, cuing off of the spoon, presented his cheek pad. After several repetitions of this, Helen slowly moved the spoon away and used only her fist as the cue. Ben caught on quickly and would readily station his cheek pad to her fist. With the spoon free, Helen was able to use the same method she used to train *cheek pad* to train *ear*. She stationed Ben's cheek pad at the cage front using the fist cue and carefully slid the spoon handle through the cage front toward Ben's ear. Ben, seeing the spoon, tried to present his cheek pad to the spoon handle. Helen said "No….Ben, cheek pad" and repositioned her fist at the cage front. The first cue for cheek pad to spoon was still strong for Ben, but when cued again with her fist he stationed his cheek pad properly. Helen tried again only this time she said "Hold…hold…hold" while she slipped the handle toward Ben's ear. The words seemed to distract Ben until Helen was able to touch the handle to Ben's ear and bridge him. As with cheek pad, she slowly held the handle further away from his ear and Ben learned to turn his ear until it was flush with the cage front.

During subsequent sessions, Helen worked on lengthening the time Ben would hold his ear in place, and began desensitizing his ear by touching it with her fingers or other objects while Ben held still. Finally, she tried touching the ear with the thermometer. Ben held fine for all of this stimulation, and even seemed to enjoy the sensation of having his ear manipulated. Helen transferred the cue for ear from the spoon handle to the tip of the thermometer and the verbal cue "ear." Now, upon seeing

the thermometer and hearing the cue, Ben knew to place his ear next to it and wait for the sound of the bridge. Next Helen slowly acclimated Ben to the feel of the thermometer being inserted into his ear. This step took a bit longer, but eventually Ben tolerated this, and Helen was able to take his temperature. Finally, Helen trained Ben to present his other ear to the cage front. She really only needed one ear to take his temperature, but she wanted to see if she could teach him the concept of presenting his other side, thinking it might someday come in handy. Helen tried putting the thermometer to the cage front and saying "ear," but placed it near his other ear. Ben just slid over and put his right ear to the thermometer, the one he had been trained to present. Ben continued to offer only his right ear despite the thermometer's location. Helen tried something else. She asked Ben to station his head to the cage front. When he did, she tried again by placing the thermometer to the left side of his head. It worked! Ben turned his left ear to the thermometer. Helen was delighted. She had just saved herself from repeating steps 2-5 on the left ear. Ben was heavily rewarded, of course.

Helen was amazed at how quickly Ben had learned this fairly complex behavior. The most difficult part of the training for her had been to keep clear in her mind what she was asking Ben to do so that she was ready to bridge him the instant she saw the behavior. The time she had spent thinking of all the steps she might need to train to arrive at the final behavior had been very helpful because Ben often progressed more quickly than she expected. This way, she felt prepared to move forward as soon as the previous step was complete. Helen was ready to move on now. She found training with Ben to be very challenging and rewarding, and she saw many potential uses for training in daily management. Her only problem was what to train next.

In the example, Helen and Ben don't encounter any real training hurdles; if the project you are working on doesn't proceed this smoothly, don't become discouraged. Ben was a very easy animal to work with and there were no enclosure mates to interfere with the training sessions. There are some important things Helen did, however, that helped make training this behavior go so smoothly.

1. Helen began by capturing an existing behavior and shaping it into a useful one. There are many things an orangutan may already be doing that can be shaped into useful behaviors saving time and effort in the process. A good trainer will look for these shortcuts.
2. Helen talked with other trainers to plan the steps needed to shape the behavior. Good trainers spend almost as much time thinking, planning, and visualizing the training process as they do actually training.

3. Although Helen had laid out her training steps, she remained flexible. She took a chance to see if Ben could learn to present his left ear without going through all the steps used to train his right ear. She continued to think and readjust her plans throughout the process.
4. Helen had established a good trusting rapport with Ben and she had no problems keeping him motivated. Ben remained eager to earn his fruit rewards.

What About When Things Don't Go Smoothly?
Ben was the ideal pupil for Helen. However, many animals do not have Ben's motivated yet calm demeanor. Orangutans may behave aggressively toward their trainers by attempting to bite, grab, or spit at them. Other orangutans may not be motivated to participate in their sessions. These animals may seem completely uninterested in training by refusing rewards, not responding to the trainers' cues, and sometimes leaving during a training session.

If Ben had been aggressive toward Helen, she would have needed to begin by evaluating his aggressive behavior and developing an action plan for overcoming it. The following are some helpful tips for Helen when training an aggressive Ben.

1. Helen's personal safety should be her greatest concern. She should never put herself at risk.
2. Helen needs to treat overcoming Ben's aggression as a behavior. This should be the first behavior that she should attempt to train. She should begin by ignoring aggressive incidences and reinforcing behavior that is not aggressive. She will likely need to begin with very short training sessions initially, teaching Ben to tolerate her presence by reinforcing his calm behavior.
3. Once Ben is able to remain calm for a few minutes during his interactions with Helen, she can attempt to train a simple behavior such as touching an object. Helen should expect Ben to grab and try to take the object, so she should choose an object that is safe and expendable. If Ben does grab the object and won't let go, Helen should let him have it. A tugging match is one game Helen can't win, and it can become a very reinforcing game for Ben. Helen should work toward reinforcing calm and gentle touches of the object.
4. When Ben is responding to training and is able to interact calmly with Helen, he may still display aggressive tendencies during the training sessions. In response to these aggressive outbursts, Helen may need to use what trainers call a time-out. A time-out is when the trainer briefly leaves the session and the animal has no opportunity to earn reinforcements. To be effective, time-outs should immediately follow an undesired behavior. They only work

if the reinforcements are very strong and the animal is interested in earning them. If Ben's aggression was intended to get Helen to leave the training session and Helen used a time-out, she would be inadvertently reinforcing his aggressive behavior and the time-out would be counter-productive. Time-outs should be used sparingly and only for the most aggressive outbursts to be most effective.

5. Animals that have aggressive tendencies may become more easily frustrated while learning new training steps than non-aggressive animals. Helen will always need to be aware of Ben's aggressive tendencies and will need to watch him closely for the early signs of frustration. To relieve tension, she will want to encourage Ben to succeed during his training sessions by interspersing behaviors with which he is confident throughout the session. Limiting the causes of aggression may help avoid the necessity of time-outs, making them more effective when they are necessary.

What if Ben Lacked Motivation?

If Ben was selective with his reinforcements, was not focused, or was leaving his sessions, Helen would first want to investigate why. Assuming Ben was healthy and his behavior was otherwise normal, she might try a few of the following ideas to increase his interest.

1. Helen may first want to try a variety of different and more novel reinforcements than the ones she had been using. Ben's interest should increase immediately if his lack of attention had been due to boredom with his reinforcements.
2. Ben may also be more responsive if Helen tries training him prior to a meal. If Ben is hungry, his reinforcements may be more appealing to him and he may be more motivated to earn them.
3. Helen may try training at different times during the day. External pressure in Ben's environment, such as social interactions, and feeding or cleaning times of neighboring group, may affect his motivation during his training sessions.
4. Helen could vary the length of her sessions to stimulate Ben's interest. A few very brief sessions over a period of several days might surprise Ben and he might be more attentive at the next longer session. Adding variety to any part of a training session, including its length, can help stimulate interest.
5. Helen needs to watch Ben closely to be sure his lack of motivation is not caused by frustration over a training step that is too difficult. New learning should be reinforced heavily and training steps may need to be broken down into even smaller steps.

Working with an aggressive or unmotivated orangutan may be more challenging than Helen's experience with Ben, but it may also be very rewarding. The relationship that develops during training between the

animal and the trainer is one built on trust. This trust may take longer to establish with an aggressive or aloof animal, but it will prove to be a valuable asset that extends to interactions between the caregiver and the animal outside the training sessions. Trainers have noted changes in their orangutans, such as aggressive animals being less aggressive, shy animals being less timid, and aloof animals being more interactive with their caregivers as a result of this stronger relationship.

TWO IMPORTANT TRAINING TECHNIQUES

Targeting and desensitizing are two of the most commonly used techniques for training most husbandry behaviors. Gaining an understanding of these two methods and learning to apply them can enable you to shape a variety of husbandry behaviors.

Targeting

Targeting is a way of shaping a behavior from a distance in a situation where physical contact is impossible. When training domestic animals, it is often safe to have physical contact with them. They can be shown how to sit or roll over by placing their bodies in that position. With an adult male orangutan, that is obviously not possible, so targets are used instead. A target can be thought of as a safe extension of your hand that can help you show the animal how you would like it to position its body. In the story about Ben, Helen used a target to train Ben to present his cheek pad and then his ear to the cage front. Helen was able to shape the position of Ben's head by moving the target. If Helen had not used a target, she would not have been able to reach Ben's cheek pad to start the initial communication. She would have had to wait until Ben by chance moved his cheek pad closer to the cage front, then she would have bridged and rewarded him, and had to wait again. It would have taken much longer for Ben to understand what Helen was trying to communicate. Targets are a shortcut for shaping many behaviors, including teaching orangutans to present body parts to the cage front.

Any object that cannot harm the animal if they happen to pull it into the cage can be used as a target. Spoons, plastic spatula handles, and wooden dowels can all be used effectively as targets. If any of these objects are pulled into the cage, they cannot cause harm and they are easily replaced if destroyed.

Desensitizing

Desensitizing is the process of making something tolerable that was once aversive. It is taught using successive approximations, but shapes tolerance to a stimulus rather than shaping a physical movement. Helen desensitized Ben by gradually familiarizing him with the look and feel of the ear thermometer to dissipate any fear related to it. She reinforced

him for holding still while not reacting to anything she did with the object.

Desensitizing requires attention to the animal's subtle cues and learning how to read them. Because you are asking the animal to allow you to do something that may be momentarily painful, uncomfortable, or frightening to them, it is important for the animal to trust you, and to move ahead slowly. *Only move forward when the animal is accepting the current level of stimulation without hesitation.*

When training a behavior that requires tolerating pain (e.g., accepting a prick from a hypodermic needle), it is very important to reward any discomfort heavily, matching the size of the reward to the difficulty of the behavior. Fear, which increases muscle tension, can increase the pain of injections or blood draws. When an animal is aware of what is going to happen, trusts its trainer, and expects a desirable reward following the pain, there is less fear. The animal maintains the option of not participating and this realization seems to make a difference. It is amazing what an animal will tolerate voluntarily. Desensitizing an animal to something painful such as an injection is the most difficult type of behavior to train, but it can and has been done.

While targeting gives you access to a body part, desensitizing allows you to perform a procedure on that body part. Most husbandry behaviors require the training of both methods to achieve their goal.

TRAINING ADDITIONAL BEHAVIORS

Would you like to be able to train one of the orangutans in your care to open its mouth and let you examine its teeth? How about being able to give it an injection of a sedative before its physical exam instead of having the veterinarians dart it? It would be nice to be able to clean and apply salve to a wound that needs attention without needing to sedate the animal. All of these procedures can be trained by first gaining access to the animal's body part by using a target to shape the presentation of that part to the cage front and then desensitizing the animal to the fear or discomfort of the procedure. Remember*; only move forward when the animal is accepting the current level of stimulation without hesitation.* The following are some brief outlines of the steps you might use to train the above behaviors.

Examine Mouth

1. A few sprays of juice from a spray bottle are a good reward to use during training sessions, and they can help you train an orangutan to open its mouth. As you spray the juice, it will need to open his mouth to catch the spray. Sound the bridge as soon as

it opens its mouth, but reward it with something other than the spray.
2. Associate this new behavior of opening its mouth with a hand cue.
3. Begin to select only the open mouth behaviors that are the widest and no longer reinforce those that are not as wide.
4. Slowly lengthen the time the orangutan needs to hold his mouth open before sounding the bridge and reinforcing him. Begin to reinforce only those open-mouth behaviors that are held open longer.
5. Now reinforce only those open-mouth behaviors that are both wide and long.
6. Slowly desensitize the animal to a light being shone into its mouth while it holds it mouth open.
7. Slowly desensitize the orangutan to any other procedure you desire, such as examining or brushing its teeth.

Giving an Injection

1. Train the animal to present to the cage front a body part that would be a suitable injection site. The animal's shoulder is one preferred site. Use a target to shape the presentation of the shoulder using the same method that Helen used to shape Ben's ear presentation.
2. Gradually extend the length of time the animal must hold its shoulder at the cage front before receiving reinforcement.
3. Desensitize the animal to a gentle touch of its shoulder skin.
4. Increase the stimulation to the shoulder skin by gradually using a hard touch and working up to pinching the skin and/or pulling hair.
5. Introduce a capped syringe to the animal during the sessions by having it in view during the session. Begin to touch it to the animal's shoulder lightly. Once this is well tolerated, do the same with an uncapped syringe.
6. Scratch the skin with a sterile syringe needle causing slight discomfort. Reinforce the animal heavily for holding still. Intersperse any uncomfortable behaviors with many fun behaviors to keep the session positive for the animal.
7. Prick the shoulder skin with a sterile syringe needle. Reinforce first attempts heavily even if the animal pulls away. Expect the animal to be leery and the behavior to regress initially. Advance only once the animal holds still for the prick without pulling away. Don't overdo! Each animal will have a tolerance level. Try to end with the best attempt of the session and heavily reinforce.
8. This step is optional; inject a small amount of sterile water into the shoulder. Reinforce first attempts heavily even if the animal pulls away. Again, intersperse the injection with many fun behaviors as well as many shoulder presents without any pain involved. Pay

attention not to reinforce the "pulling away behavior" but reinforce the "lean in" or "hold" at the cage front.

It may take a long time to train an animal to accept an injection reliably, so don't become discouraged. Remember we are asking them to hold while we put something that may burn or sting into them.

Collecting a blood sample

Desensitizing the animal to the blood collection sleeve would entail allowing them to see the sleeve and explore the sleeve while being reinforced for appropriate behavior.

1. Establishing a hold behavior while the arm is in the sleeve, gradually working up to the amount of time needed to collect a blood sample.
2. The same steps that were followed for injection training can be followed for the presentation of the needle and syringe or whatever set-up is chosen to use. The difference being desensitization of the forearm, looking for a blood vessel instead of a shoulder or hip muscle.
3. Blood collection is easier than injection training because we are not putting something in that stings or burns but rather we are taking out!
4. Remember to reinforce for the complete behavior. That is holding while the needle is removed from the site as well.

Treating a Wound

Be proactive. Train the animal to present as many body parts as possible. Desensitize these areas to the feel of a variety of stimuli such as a warm cloth, ointments, and cotton swabs. When an animal receives an injury you would like to inspect or treat, chances are you will already have access to that area. Some additional desensitization to the injured area will probably be necessary, but you will already be well ahead of the game.

Moving Animals

On the of the more common complaints of orangutan caregivers is difficulty teaching animals to move from one enclosure to another, or on and off exhibit, reliably. Caregivers rarely consider using training to overcome this problem, but it can be trained using targeting and desensitizing.

There may be many reasons a particular orangutan might be difficult to move; many of which we may understand, and many of which we may never figure out. Whatever the problem or the animal's motivation, we generally have difficulty solving it because the problem is rarely given the time and attention needed to find a solution. Moving animals is

especially difficult because the caregiver is usually motivated to move the animals, creating pressure on the caregiver to succeed. Enclosure cleaning is generally dependent on moving animals out of the area. Going home for the night is often dependent on moving the animals into their night quarters. Inconsistencies in the way various caregivers handle the problem may inadvertently reinforce difficult behaviors. Once the problem has been identified and everyone involved with the animal's care is in agreement, a formal training program can be implemented. Open-group discussions are an important first step toward creating an effective training team. Start by setting guidelines that all the trainers and supervisors can agree upon. Decide as a group how each caregiver should handle each situation to provide consistency for the animals. Examples might include agreeing not to hose the animals to move them, or not to withhold food. The group must also be willing to be flexible with the usual schedule for cleaning or coming off an exhibit to eliminate the pressure to adhere to a particular schedule. The group may decide to have only one or two caregivers work with the animals during the training period to reduce inconsistencies even further.

As in any training program, the first goal in training animals to move as requested is to establish a trusting relationship with each animal being trained. Assigning one trainer per animal is ideal. The trainer and the animal will benefit from spending as much one-on-one time together as possible, with that trainer hand feeding the animal whenever time permits. The trainers will need to coordinate times when they can train together. The more animals that are in the group, the more difficult this becomes, but even one ten-minute session each day can produce wonderful results.

Once a good rapport is established, a training plan can be devised for each animal. Some of the animals will simply need to be trained to stay with their trainer to keep them out of the way, while others will need to be desensitized to all the stimuli involved in the moving process. Shape the behavior of moving into the adjacent enclosure by breaking it down into very small steps. Here are some examples of the steps that might be included in training an orangutan to move from enclosure A to B. For this example, the animals that are difficult to move are more comfortable in enclosure A and refuse to move into enclosure B once it has been cleaned.

1. Teach all the orangutans that they can only receive reinforcement from their particular trainer. Other trainers should never pay attention to or give food to an animal they are not training during a training session.
2. Teach all the orangutans to touch a target while in enclosure A.
3. Teach the orangutans to move to various spots at the enclosure front within enclosure A to touch their targets.

4. Teach the orangutans to follow their trainers from enclosure A to enclosure B to touch their targets. If an animal is hesitant to follow its trainer to enclosure B, some approximations of that behavior may be necessary. Reinforce the animal for going to the doorway, passing part way through the doorway, and finally entering enclosure B.
5. Lengthen the amount of time the orangutans spend in enclosure B during the training session.
6. While in enclosure A, begin to desensitize the orangutans to the door closing. Always begin this process in the enclosure that the animals are most comfortable in. Have another person begin to rattle the door between the enclosures while the trainers and the orangutans continue their training session. This is the first step toward desensitizing the door closing.
7. Continue to desensitize the orangutans by partially closing the door, and eventually locking it closed. Reinforce each animal heavily for staying with their trainer and ignoring the movement of the door.
8. Once the orangutans are able to ignore the movement of the door during the session, repeat the entire process in enclosure B. Expect this step to proceed more slowly because the animals are less comfortable in this enclosure. Remember to be sensitive to each orangutan's comfort level as you move forward. The goal is not only to close the door, but for the animals to feel comfortable with each step in the process. Try to strike a balance between maintaining that comfort level and making progress. If the animals are participating readily in their training sessions, then you can assume you are not pushing them too quickly.
9. When the animals are comfortable being locked in enclosure B, work toward finding the minimum number of trainers and training sessions needed to successfully maintain the behavior. Once on a maintenance schedule, there may be periods when animals, which were once well trained, no longer cooperate. In these instances, a short intensive training period can reinforce the desired behaviors again. Maintaining the trained behaviors within the constraints of a realistic daily routine should be the training team's ultimate goal.

There are many ways to accomplish moving animals form one place to another. The three things that will affect training programs are facility design, trainer and animal.

PROBLEM-SOLVING CHECKLIST

Every caregiver who undertakes the challenge of training an orangutan will encounter some difficulties regardless of their training ability or the responsiveness of the animal. When you run into stumbling blocks such

a plateaus, animals not participating or responding consistently, or not making progress as quickly as you had hoped, review the following list of questions for help.

1. **Does the animal seem to have lost its motivation?**
   When an animal that was once very attentive during the training sessions becomes easily distracted and leaves the sessions frequently, you may need to reevaluate your reinforcement. Those small pieces of fruit may not have the same appeal they had a few weeks ago. It is important to use a variety of rewards from the beginning. It is also helpful to keep them in some sort of deep container so that the animal doesn't know what rewards you have on any particular day. If you think your reinforcements are the problem, try some new ones. Be sure to compensate the animal appropriately for more difficult behaviors, too. You will see a change in attitude right away if the reinforcements were the problem.

2. **Does the animal appear frustrated? Does he display and leave the session, or only respond to the cues for simple behaviors?**
   When this happens, the first thing to do is to have another trainer (or anyone who is familiar with that animal) observe and critique several of your sessions or videotape yourself. By doing this, you may gain insight into where you are having problems. You may be bridging the animal late, or frustrating the animal by giving it unclear signals. Check with other trainers working with that animal to be sure there are no inconsistencies in the way you are cueing the behaviors, and how large a reward you are giving for each correct response. Be sure your sessions are not too long. You may be asking for too much at once. Try playing the training game (Pryor 1984, pp.66-72), and train a person to do the same behavior you are training with the animal. Moderate frustration is not something that must always be avoided. It is often a sign that some learning is about to take place.

3. **Have you reached a plateau that you are unable to move beyond? Has the animal stopped making progress toward the training goal?**
   It is not uncommon to be training with wonderful results when suddenly you no longer seem to be making headway. If you feel your reinforcers are working well and there are no problems with inconsistencies with co-trainers, then try breaking the steps down into even smaller increments. If this isn't possible or it doesn't work, try training the behavior from another angle. Find a whole new series of approximations to get to the final behavior. There are always many ways to shape the same behavior. Remember, too, that many plateaus are really just the thin barrier before a big breakthrough. Some plateaus will resolve themselves. The training game may help you here, too.

4. **Is the animal distracted by stimuli in its environment?**
   This is a very common problem. The trainer may be competing for the animal's attention with a number of environmental stimuli. There may be dominance of other social pressures in this group, or from an adult male in an adjacent cage. There may be a desirable female in the adjacent enclosure that is more interesting than your rewards. Any of these distractions can intimidate an animal or lure him from a training session. The solution is to be patient. Realize that because of these distractions, the training will probably progress more slowly. You can try using other trainers to distract the animals causing the distractions. You can always try training at a different time of day. Keep trying!

   Review of The Ten Laws of Shaping (Pryor, 1984) to see if that helps with any dilemmas.

TIPS ON WORKING AS A TEAM

There are definite advantages to working alone and advantages to working with other trainers. If you are working with an animal that is housed with one or more conspecifics, you will most likely need to work together with at least one other person.

Working together successfully requires keeping the lines of communication open by having regular meetings to discuss problems and progress. Be sure to maintain clear records so that trainers who are working with the same orangutan are informed about what is happening during co-trainers' sessions. An example of such a record is included in the Recordkeeping Recommendation chapter, this volume. It is important to be familiar with each other's reward selections and reinforcement schedules by observing each other's sessions or videotaping them for later viewing. If, for example, Helen always gives Ben a whole banana for allowing his temperature to be taken, and Tom, who has been trained to maintain the behavior, only gives Ben a grape for the same behavior, Ben will become disinterested when working with Tom. Tom will be unaware until he watches one of Helen's sessions.

The same is true for ensuring that each trainer is giving consistent cues for each behavior and has the same criteria for rewarding each behavior. This means that all the trainers who maintain a behavior agree on what that behavior should look like before it is reinforced. For instance, the trainers should agree that the behavior of opening the mouth for inspection means that the animal opens its mouth as wide as it can for a count of three or the behavior isn't reinforced. This communication takes time, but it is important, especially when many trainers are involved in the same program. If trainers are not careful about maintaining

consistency, behaviors that were previously well trained may begin to break down.

All of this group cooperation has its advantages. It is more rewarding to share ideas, frustrations, and most of all success with co-trainers. A group can inspire and help everyone maintain momentum. The workload is shared by a number of people so that more can be accomplished. Once a behavior is finished and other group members understand how to cue the behavior and what its reinforcement criteria are, any one can maintain the behavior. If you train alone, when you leave, the behavior leaves.

When working with others there will inevitably be differences in philosophy, training styles, and interpretation of an animal's behavior. The most important thing you can do to ensure a successful training program is to remember that you are a part of a team and that competing egos can destroy the team. When a fellow trainer is recounting to you how an animal was responding incorrectly to cues and you find yourself starting to stay, "He works for me," hold back those words! Other statement such as, "That will never work" and sentences that include the words "my animal" are also your ego speaking. Remember that you're working together toward a common goal for the best interest of the animal and egos can hinder this process. If you can put your ego aside, it will be easier for others to do the same. A team effort requires taking the time to cultivate a good cooperative working environment by listening to each other with an open mind and being willing to try ideas other than your own. The program's success depends on every trainer in the group succeeding.

The following is a list of the ingredients that help ensure a successful training program.

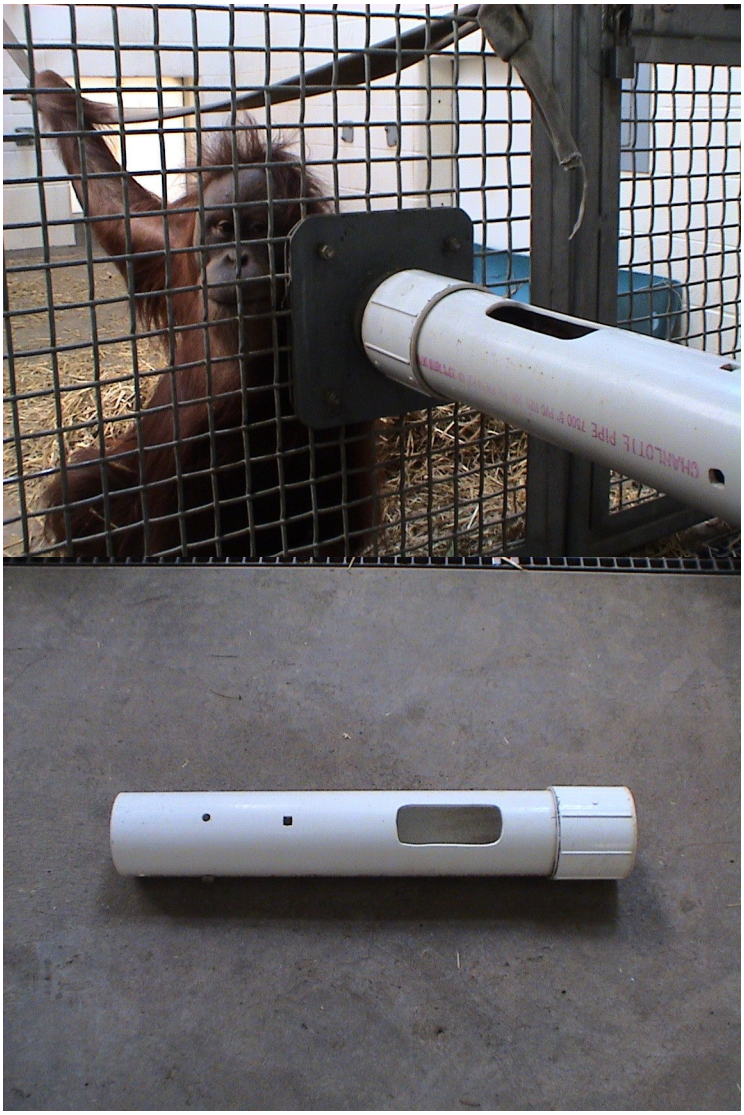
- Ensure that the necessary resources such as staff time and institutional support are available.
- Build trust between the trainer and animal.
- During the training process, assign one trainer per behavior.
- Find a good set of reinforcers.
- Set clear goals and lay out the training steps needed to arrive at those goals.
- Keep clear records of your training sessions. Records are an important way to measure your progress. They are invaluable to others training similar behaviors.
- Be flexible and open to changing your training plan. Don't remain on a plateau for too long.
- Train other people to work with the animal so that more than one trainer can maintain behaviors.

- Check for consistence among trainers by observing each other's sessions, videotaping your own sessions and keeping accurate written records.
- Keep your ego out of the training process. There are many ways to train the same behavior.
- Remain open to constructive criticism.
- Continue to observe others and read to improve your training technique.
- Maintain respect for the animals and people with whom you work.
- Believe in the power of positive reinforcement training.

SUMMARY

Positive reinforcement training is a developing technique that will enable orangutans and their caregivers to achieve new levels of cooperative care. For those caregivers who are already achieving good results with positive reinforcement training, our hope is that we will be able to build on each other's successes. To those caregivers who have not yet begun training, our hope is that you will be inspired to incorporate training programs into your daily management routines. The atmosphere of cooperative care established by such a routine will give caregivers a valuable tool to use toward proactive problem solving.

Included are photos of the blood collection sleeve used at the Louisville Zoological and Botanical Gardens.


CHARLOTTE PIPE

References

Pryor, K. 1984. *Don't Shoot the Dog*

Ramirez, K. 1999 *Animal Training: Successful Animal Training Through Positive Reinforcement*

Suggested Reading

In Addition to the following materials, check current American Zoo and Aquarium Association, American Association of Zoo Keepers, Animal Behavior Managers Alliance, International Marine Animal Trainers Association, and International Avian Animal Trainers Association conference proceedings and newsletters for articles and training projects.