
"Getting to the Heart of Behavior Management in the Heart of Texas"
2014
Dallas, Texas
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GETTING TO THE HEART OF BEHAVIOR MANAGEMENT IN THE HEART OF TEXAS

Animal Behavior Management Alliance

2014 Annual Conference

April 13-18, 2014

Dallas, Texas

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One of the core values of the ABMA states that:

> *"The sharing of knowledge and new ideas is fundamental to advancing animal behavior management. "*

We do this in many ways, such as through our conferences, publications, and social media. Our written publications feature many fascinating and thought-provoking papers and articles. Some you may agree with, others may challenge your perceptions and ideas. And while the content that you read reflects the views of the author and does not necessarily represent the feelings of the ABMA or the board of directors, we think that the diversity of subjects and viewpoints represented by our members, at our conferences, in our publications, and via our social media outlets is one of the strengths of this organization. We encourage you to take in all that you read with an open mind, because you might be surprised by what you learn. Thank you and enjoy the proceedings!

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Keynote Speaker

Constructional Interactions between Humans and Other Animals

Dr. Jesus Rosales-Ruiz
University of North Texas

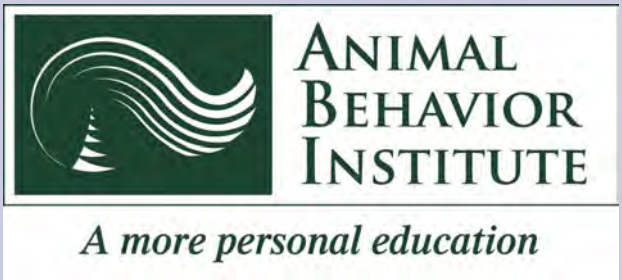


Increasingly, humans have become part of the lives of other animals and other animals have become part of our lives. The ways in which people and animals interact have changed over time as our understanding of animals' physical, emotional, and intellectual needs continues to evolve. Currently, many domestic animals and captive exotic animals are dependent on humans for food, water, shelter, and other necessities. Although the same laws of nature apply to all living organisms, each animal, like each human, is a unique individual because the animal's behavior and personality reflects the environmental conditions in which the animal lives. Thus, it is imperative that we understand each animal's individual needs so that we can construct environments that produce optimal interactions between people and animals. But how do we do this? This presentation will describe an approach derived from Skinner's functional analysis of behavior that will help us understand the nature of our current interactions with our animals and that can also help us improve these interactions and the animal's quality of life. This approach is known as constructional behavior analysis (Goldiamond, 1974).

Jesús Rosales-Ruiz is an associate professor at the University of North Texas in the Department of Behavior Analysis. He obtained his Ph.D. from the University of Kansas in 1995, under the mentorship of two pioneers in the field of behavior analysis, Donald M. Baer and Ogden R. Lindsley. Jesús is one of the few scientists in the world studying animal training from both the theoretical and applied perspectives. He, along with his students, has greatly contributed to the understanding of the science and practice of animal training. He also studies the antecedent control of behavior, generalization, behavioral cusps, fluency-based teaching, treatment of autism, teaching of academic behavior, rule-governed behavior and contingency-shaped behavior. Jesús has served on several editorial boards, including the Journal of Precision Teaching, the European Journal of Behavior Analysis, and the International Journal of Psychology and Psychological Therapy. He has also served as a reviewer for the Journal of Applied Behavior Analysis, the Journal of Neuroscience Methods, Behavioral Processes, and the Experimental Analysis of Human Behavior Bulletin. Jesús is a fellow of the Eastern Psychological Association, a trustee of the Cambridge Center for Behavioral Studies and a member of the Association for Behavior Analysis International.

Research and Evaluation Workshop

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The Difference a Measure Makes: How Science and Practical Solutions Can Take Your Training to a New Level

Sophia Yin DVM, MS
Drsophiayin.com



Studying animal behavior is like solving a mystery. Start with the clues, which generate questions. Then develop a hypothesis as to what's going on and make predictions based on your hypothesis. Next decide how best to make observations and which measurements are appropriate to test your predictions. Don't miss Dr. Yin's primer on conducting behavioral research including the scientific approach, developing a hypothesis, designing a study to test the hypothesis, gathering data and analyzing the results. Extra time is devoted to what makes behavioral research different from research in other fields and sample problems will be presented so attendees get a chance to work through the process of developing a question, making a hypothesis and then testing the hypothesis. This will help all attendees learn to think analytically.

Dr. Sophia Yin is a veterinarian, applied animal behaviorist, and the author of many books, including *Perfect Puppy in 7 Days, How to Behavior So Your Dog Behaves,* and *Low Stress Handling, Restraint and Behavior Modification of Dogs & Cats* (book and DVD). She sees behavior house calls and lectures and teaches workshops on animal behavior, training, and low-stress pet handling in the U.S. and internationally. She writes for a number of veterinary and popular magazines, and was for five years the award-winning pet columnist for the *San Francisco Chronicle*. She has consulted for several zoos and served as a behavior expert for TV shows such as Animal Planet's *Dogs 101*. Dr. Yin's mission in life is to improve our understanding of animals and their behavior so that we can care for, appreciate, and enjoy our time with them better. Learn more at her animal behavior website, drsophiayin.com.

Sadly on September 28, 2014, Dr. Sophia Yin passed away. This was a huge loss for the training world. Her passion for ensuring that we are providing the best animal care in the most positive way possible was inspiring. The ABMA was honored to have had her present for us. In return she was impressed by all that we are already doing to improve the lives of our animals.

Introduction

Studying animal behavior is like solving a mystery. Start with the clues, they will generate questions. Then develop a hypothesis about what's going on and make some predictions based on the hypothesis. Next a decision must be made as to how to make the behavioral observations and how to measure those observations in a way that will test the prediction. Why is this scientific approach important? To understand, we need to look back in history.

Background

In the late 1800s and early 1900s, psychology and animal behavior were in their infancy. Much of our understanding of animals was anecdotal and there was no established methodology for studying animal behavior.

Then, in the early and mid 1900s the field started to change. These changes were brought about, in part, by the case of a horse named Clever Hans. At the turn of the century, Clever Hans was said to possess remarkable intellectual skills. When his trainer would pose an arithmetic question, Hans would tap his hoof on the ground the same number of times as the correct answer. The trainer would write a problem on the blackboard and Hans would answer correctly. Or the trainer would ask Hans to identify the number of people in the audience carrying an umbrella and Hans would answer correctly. Even if the questions were posed to Hans by people other than his trainer, the horse often produced the correct answer. People, including scientists were astonished that this horse was able to perform arithmetic.

At one point a panel of scientists looked more closely as Clever Hans performed and found that Hans' trainer calculated the answer to the problem and after Hans gave the correct number of taps, he unconsciously gave a signal. This also occurred with other humans who posed the mathematical questions. When the questioner or Hans' trainer didn't know the answer to the question, Hans could not calculate the correct answer. What Hans really possessed was a fantastic ability to read human body language rather than sound mathematical skills.

This story put the study of psychology and animal behavior at risk in terms of being taken as a serious field of science. Those interested in animal behavior responded by taking a more methodical approach to the study of animal behavior—one that was based in sound scientific methods, the same as those used in the well-established fields of science.

The Scientific Approach

The scientific approach starts with making observations and then asking a question. For instance someone who own horses might wonder if a high-energy diet causes horses to become hyperactive. Or someone who raises sheep may wonder whether early handling of lambs in the first several days of life will affect tameness to humans later in life.

Step two is to formulate a hypothesis and make predictions. The more known about the animal the easier it is to devise a hypothesis. Additional observations may be needed in order to

arrive at a hypothesis. Once the hypothesis is formulated, specific predictions are made that can be tested.

After the predictions are made, a well-thought-out experimental design is developed to test the hypothesis. The point of an experiment is to find out whether varying one condition produces a particular outcome. In the simplest experiment just one condition (the **independent variable**) is varied. Measure the effect on one or more outcomes (**dependent variables**) while holding all other variables the same. Affect on an experimental group could be due to the treatment applied or to a confounding factor so a control group is needed to help diminish the confounding factors.

A **control group** is a group of subjects that does not receive the experimental manipulation but is theoretically similar in all other respects to the other subjects in the experiment. The **treatment group** is the group of subjects that receive the experimental manipulation. A comparison of the outcomes is made between the control group and the treatment group. The difference between the two is assumed to be due to the treatment. The subjects must be assigned randomly to the experimental (treatment) and control groups and treated identically except with respect to the factor in which the experimenter is interested. It is critical to know what exactly to measure. (Case study examples will be provided in the presentation). Note that in general a minimum of 10 animals are needed for the control group and 10 for the treatment group. For many experiments many more animals than just ten in each group is needed (e.g., drug trials).

Sometimes in order to answer some questions, it is essential to perform a **comparative approach**. In this approach you look at two groups of closely related animals in their naturally occurring environment. Ideally you'd have two species in different habitats so that the only difference is the behavior and the habitat. For instance, someone may notice that female dogs don't recognize their specific offsprings' cries from the cries of other puppies and therefore think that means dogs are degenerate and dumb. They may formulate a question like, why are some species better at recognizing their young than others? They might hypothesize that species living in flocks or colonies where there are many parent-offspring groups need to recognize their offspring more than those where parent-offspring groups are more isolated. And that with some animals such as dogs, when living in the wild there usually are not many litters raised in close proximity, so offspring recognition through vocal communication is not that important. With this for a hypothesis, a prediction may be made that animals living in flocks would recognize offspring better than those that do not live in flocks or herds. Next it would be time to test this hypothesis. (Examples will be provided in the presentation).

Describing Behavior

When working in and conducting experiments in the field of animal behavior, it's important to know how to describe behavior. That may sound like a "no-brainer" but it is frequently the place where experimenters go wrong. This is the most basic, essential skill for understanding behavior and the one that nonscientists are most likely to overlook.

Naturally, we see the world from our human point of view. However, when making observations for science, this tendency can lead to making incorrect conclusions. We often see people naming behaviors instead of actually describing them. When names are used the name needs to be thoroughly described so that all people viewing the same behavior agree on the name. Descriptions should inform others specifically what was observed in an objective way without bias to any one person's experiences or personal beliefs. When conducting research, avoid anthropomorphizing (giving complex human characteristics to animals) or automatically giving human-based reasons for an animal's behavior. Animal behavior researchers accept that animals have basic emotions such as fear and happiness. These emotions are essential for survival. However it is not accepted that animals have an innate sense of what constitutes immoral behaviors. Not even all humans seem to be able to get that right. When more human-like behaviors and thought processes are suspected these ideas must be systematically tested (just as all other behaviors should be systematically tested).

There are different levels of description. With empirical or motor pattern descriptions, we describe the behavior in terms of body parts, movements and postures (e.g., baring teeth, grooming, and barking). When studying new species or those where little to no study history exists, motor pattern descriptions should be used. The biggest mistake observers make is jumping right to functional descriptions. A functional description is one where the behavior is described in terms of its function (bare-teeth treat, maternal grooming, alarm call, nest building, egg retrieval). The problem is these labels can mean different things to different observers. In all cases the behaviors being studied need to be well-defined.

Practice Problems

1. Your friend says there's a squirrel in her yard that sits on a branch. "My dog runs out to the yard and barks at the squirrel. The squirrel just stays on the branch and just teases him. The squirrel is so mean." Questions: Is the squirrel really teasing the dog? What are some other hypotheses and what predictions would you test for each alternate hypothesis you make?
2. Three dogs are in a room—a Scottie, an Australian Cattle Dog and an American Bulldog. The American Bulldog is a visitor and he's harassing the Scottie. The Australian Cattle Dog who has been sitting quietly, barks in a high pitched tone and the two other dogs stop. "She's playing referee, (i.e., protecting the Scottie) says one observer. Question: Is this likely to be true? What are some alternate hypotheses and what predictions would you test for each alternate hypothesis you make?
3. You have a dog that has storm phobias and is also fearful of storms sounds on DVD. Your friend says, "Use valerian root. It will stop the anxiety for sure." You are a researcher with access to many dogs like your own. How would you test out your friend's hypothesis? Describe exactly what you'd measure.
4. Two friends come over and play with your dogs, a Jack Russell Terror and an Australian

Cattle Dog. The two dogs go out into the yard and when the cattle dog squats to urinate, the JRT starts to mount her. One friend says, "Your Jack Russell is trying to dominate the cattle dog." Your other friend says, "Hmm I don't know about that. It seems like something else." What are some alternate hypotheses and what observations would lead you to support one or the other. (Dominance definition: Dominance is a relationship between individuals. It's established through force, aggression and submission in order to gain priority access to resources such as food, toys, playmates, etc. A dominance-submissive relationship exists only after one of the individuals consistently defers to the other). Dominance is not a personality trait.

For More Information

- Read *Measuring Behaviour: an introductory guide* by Paul Martin and Patrick Bateson
- Read *Dog Behavior Evolution and Cognition* by Ádám Miklósi pgs 1-45
- Dr. Sophia Yin's behavior web site at www.DrSophiaYin.co
- Read *How to Behave So Your Dog Behaves* by Sophia Yin http://drsophiayin.com/dogproduct
- Read *Perfect Puppy in 7 Days* by Sophia Yin, *http://drsophiayin.com/dogproduct*
- *Low Stress Handling, Restraint and Behavior Modification of Dogs and Cats* by Sophia Yin, chapters 1 and 2, 5, 14 (Available at http://lowstresshandling.drsophiayin.com the online abridged version is available for free at http://lowstresshandling.drsophiayin.com/online/abridged)
- Read the AVSAB position statement and guidelines "The Use of Punishment in Dealing with Behavior Problems in Animals." http://www.avsabonline.org/avsabonline/images/stories/Position_Statements/Combined_Punishment_Statements.pd
- Read the AVASAB position statement on "The Use of Dominance Theory in Behavior Modification of Animals":

  http://www.avsabonline.org/avsabonline/images/stories/Position_Statements/dominance%20statement.pd
- Visit www.AVSABonline.or to find out about veterinarians and behavior.

Training 101

Baiting and Luring – Using Them Effectively is as Easy as ABC

Heidi Hellmuth
Northwest Trek Wildlife Park



Baiting or luring an animal to encourage a desired behavior is frequently used, and can be a very effective tool in behavior modification. Too often, however, it becomes a crutch; and the animal learns to rely on the bait to perform the behavior at all. This presentation will demonstrate why this frequently occurs, and will give participants simple and easily used methods to avoid this behavioral pitfall. Using the ABC's of operant conditioning – antecedent, behavior, consequence – attendees will learn to use baiting and luring effectively, and especially how to fade out the use of the bait in order to get behaviors under stimulus control more effectively.

Heidi Hellmuth has 25+ years' experience in the animal care and behavior field. Her career has included roles such as marine animal trainer, zoo keeper, wildlife educator, supervisor, and curator. She has been fortunate to have worked with many species and diverse taxa over the years. Heidi is currently the zoological curator of Northwest Trek Wildlife Park, a unique 725 acre facility in Eatonville, Washington.

Panel Discussion

Do You Really Want That Behavior?

Part 1: 60 Years of Getting Behavior
Part 2: Operational Definition of "Want"
Part 3: It's all about YOU!

Dr. Robert (Bob) Bailey
Panel:
Tim Sullivan, Chicago Zoological Society, Brookfield Zoo
Gary Priest, San Diego Zoo Global
Susan Friedman PhD, Behaviorworks.org



I describe myself as a behavioral-systems analyst and engineer, small-businessman, field biologist, animal trainer, and teacher, not necessarily in that order. My early years in the 1940s were spent trekking the desert looking for animals in the San Fernando Valley. I graduated from UCLA (Biology and Chemistry) in the 1950s and was a teaching and research assistant, studying animals in the Southwestern USA and Mexico. My training experience at UCLA includes crows, coyotes, and kangaroo rats in the wild, and captive, cephalopods, amphibians, fishes, and reptiles. I was largely self-taught, and read the works of B. F. Skinner and Keller and Marian Breland, among others. I was awarded the Doctor of Science Degree (Sc.D.) from the University of Central Arkansas in 2013 for the study and international development of biological systems.

After two years as a biochemist at the UCLA School of Medicine, I became the US Navy Marine Mammal Program's first Director of Training (1962) at Pt. Mugu, California, and conducted the Navy's first open-ocean release of a dolphin. From 1962 to 1965 I worked directly with Marian and Keller Breland, Animal Behavior Enterprises (ABE), in Hot Springs, Arkansas. In 1965 I left the Navy to join ABE and eventually became the Chief Operating Officer. ABE's business was worldwide in scope and I directed the activities of more than 40 full-time and 50 part-time employees until I closed the operations in 1990. We trained over 140 species and more than 15,000 individual animals.

ABE's clients included most of the major American theme parks, as well as a number of zoological parks, including the San Diego Zoo, Forest Park Zoo (TX), and the Swope Park Zoo (MO). ABE also developed biological systems for the USA and other governments. ABE began teaching science-based animal training procedures in the late 1940s, and I continue to develop behavioral systems and teach animal trainers and other behavior technologists around the world, nearly 70 years later.

Special Presentations

Service Dogs, Inc.

Service Dogs, Inc. is a 25 year old non-profit whose mission is to increase the independence of people living with disabilities through partnership with a highly trained assistance dog. SDI is one of the few assistance dog organizations to utilize shelter dogs in their program, taking them from "strays to stars."

Members of ABMA come together from different communities within the animal world to share experiences and learn from one another; there is a spirit of collaboration, open mindedness and willingness to learn. What if that type of collaboration happened on a daily basis? SDI found out when we hired a guy from the marine mammal community and partnered him with a girl from the dog community to lead their training department to the next level. This process has been full of debate, epiphanies, compromise and humor. We'll share the best of our revelations and highlight the unique challenges of operating an assistance dog training program.





Pavlov Pops While Skinner Selects: Navigating Respondent and Operant Learning

Susan Friedman, PhD
Behaviorworks.org



Historically, learning and behavior has been described as two distinct learning mechanisms, classical and operant. Although the distinction is fuzzy, given that both processes are ongoing all the time, a solid understanding of the differences can influence how we approach our behavior change interventions.

Susan G. Friedman, Ph.D. is a faculty member in the Department of Psychology at Utah State University. She has helped pioneer the cross-species application of behavior analysis to animals, using the same humane philosophy and scientifically sound teaching technology that has been so effective with human learners. She has written chapters in three veterinary texts, and her popular magazine articles have been translated in 11 languages (www.behaviorworks.org). Susan also writes a blog for Psychology Today (www.pyschologytoday.com). She has given seminars on learning and behavior at conferences and zoos in many countries around the world. Teaching her on-line class for professionals, Living and Learning with Animals, has provided even wider dissemination of effective and humane behavior change practices.

That's a weird title for a talk if ever there was one but it sums up a commonly used, and sometimes confused, dichotomy in the training field pretty well – classical and operant conditioning.

Cut to the Chase

Cutting right to the chase, Pavlov is mainly about reflexes, i.e., involuntary responses to a stimulus (S-R). When a puff of air (S) is directed at your eye, it causes a blink (R) to *pop* out. The patellar reflex is another example. But not all reflexes are seemingly simple. The startle reflex involves a host of involuntary responses to an alarming stimulus. The amygdala signals the hypothalamus triggering the pituitary gland to release adrenocorticotropic hormone (ACTH) and the adrenal glands to release cortisol and adrenaline, causing a cascade of physiological responses. Blood pressure increases, blood glucose levels rise, the immune system is suppressed, pupils dilate and the heart pumps quicker, bronchia dilate, sweat glands on the skin contract. Our head jerks, neck muscles contract, eye muscles tighten and blink, we flinch, shoulders raise, arms stiffen, abdomen muscles tighten, chest flattens and knees flex – all in a matter of milliseconds.[1] Awe-

some.

We don't *learn* how to startle to an alarming stimulus. Reflexes are innate – meaning the response elicited by the stimulus is fully functional right from the first exposure to the stimulus. As you know, respondent conditioning (aka Pavlovian and classical conditioning) is the process by which an innate response to a "biologically potent" stimulus is elicited by a previously neutral stimulus. This is achieved by repeated pairings of the neutral stimulus and an existing stimulus-response set.[2] Thus, one way to discriminate the difference between respondent and operant behavior is to notice that with respondent conditioning new triggers are learned, not new behavior. (In fact, the responses elicited by a learned stimulus are not identical to those elicited by a natural stimulus, but close enough for practical application.)

So, for example, after repeated pairings of a flash of light with a puff of air => blink reflex, the light alone causes a blink to *pop* out too. A natural elicitor like the puff of air is called an unconditioned (literally unconditional) stimulus (US), and the reaction it triggers is called an unconditioned (unconditional) response (UR). A learned elicitor like the flash of light is called a conditioned (conditional) stimulus (CS), and the blink it triggers is called a conditioned (conditional) response (CR). Note the absence of consequences in this model. Reflexes, thus respondent conditioning, are comprised of only two elements, antecedent stimuli and innate responses.

Skinner is mainly about voluntary behaviors, which are *selected* by consequences. What's learned from operant processes is new behavior (or new forms of existing behavior). When a package from Amazon follows going to the post office, we go to the post office more. Operant antecedents don't cause operant behavior to occur the way that a US or CS *elicits* (pops) an innate response. Operant antecedents are said to *evoke* behavior by signaling the particular behavior-consequence (B-C) contingency in play. These signals help us discriminate which behavior, of the many possible behaviors we could do, will be reinforced now. In fact, one class of operant antecedents is called discriminative stimuli (S^D). Unlike respondent reactions to eliciting stimuli, an animal can, and often does, ignore an intended S^D. In that case we say that the behavior is not "under stimulus control." This is most likely to happen when the S^D predicts weak reinforcers.

A microwave bell is an S^D. When the bell "dings" we don't open the front door or pick up the cell phone. We open the microwave door because only opening the microwave door results in reinforcement, in the presence of that bell. Fluent and automatic as the behavior may be, opening the microwave is not an innate response. It is our reinforcement history in the presence of different bells that predicts which door we'll open. Opening the microwave is evoked by the particular bell tone and hot tea selects for microwave door opening in the future, given that particular bell tone.

To sum up then, whereas respondent behavior is a function of antecedent stimuli (US-UR or CS-CR), operant behavior is a function of its consequences (B-C; or completing our model by adding signals, A:B-C (antecedent: behavior-consequence). That's the law of effect: behavior is a function of its consequences. (FYI, I have written about this subject before in an article called Pavlov's Parrots if you want another review. It can be found at www.behaviorworks.org, under *Written Works* where you will find it available in Finnish, Spanish, German and Swedish too.)

Confusion

Confusion about these two terms is commonplace. Look at the definition of respondent conditioning in an Internet dictionary under the entry, "Pavlovian Conditioning"[3]:

> **1.** A process of changing behavior by rewarding or punishing a subject each time an action is performed.
> **2.** Also called classical conditioning, a process in which a previously neutral stimulus comes to evoke a specific response by being repeatedly paired with another stimulus that

evokes the response.

Can you find the errors in this definition? Give it a spin then check my answers under the Spoiler Alert section below.

Spoiler Alert: In the first definition, operant, not respondent, processes are clearly described by mention of changing behavior, and selection by reinforcing and punishing consequences. In the second definition the word "evoke" should be replaced with the word "elicit", as is consistent with the conventional terminology describing respondent conditioning. Evoke is a term used to describe operant antecedents.

It can be confusing not only because of the technical distinctions and acronym soup, but also because the same stimulus can play different roles, depending on the behavior being assessed. For example, when a dog's sit behavior is center stage, we can describe a clean operant run: hand cue (A) sit (B) treat (C). But, if we switch to a different focal behavior concurrent with sitting, like salivating, then the hand cue functions as the CS that elicits the CR. Likewise, a cat's pupillary response (CR) or increased heart rate (CR) may pop at the sound of a can opener (CS), but running into the kitchen, a voluntary operant behavior (B), is evoked by the sound of the can opener (A) and selected by consequences (C), the food from the can.

There's a lot going with any given behavior. On earth, we behaving organisms are firing on all cylinders all the time. This dichotomous view of learning is mostly about organizing our observations and training procedures. Nature is rarely so tidy.

In sum, to assign the conventional difference between respondent and operant learning, answer these two guiding questions: 1) what is the behavior you are assessing (involuntary or voluntary), and 2) what is learned (a new eliciting stimulus or a new behavior). Ready for the test? Check your understanding of the two learning processes with the following video clip. At the end of the clip Dwight (man on the left) does two behaviors, one is respondent and the other is operant. Watch the clip, then check your answer with the one provided in the Spoiler Alert section, below. https://www.youtube.com/watch?v=nE8pFWP5QDM

Spoiler Alert: Dwight's operant behavior is offering his hand (B), evoked by the Windows chime (A), to get a mint (C). His respondent behavior is the yucky taste in his mouth (CR) elicited by the Windows chime (CS). Yep, you've definitely got this now.

Who's on First?

I readily disclose that I am an operant gal. I like the active, empowered process of operant behavior, training and learning, especially for animals in human care whose environment is typically constrained by necessity. Additionally, there is ample research evidence of the relationship between contingent access to reinforcers and the bold, exploratory behaviors we wish to see animals readily do.[4] All things being equal, I advocate teaching an animal what to do to control its outcomes with its behavior. After all, isn't that what behavior evolved for… *effect*?

On the other hand, our emotions, which are largely the result of respondent conditioning, can be an abolishing operation for learning.[5] Whenever an animal is afraid to take our reinforcers, the training dialogue shuts down. Systematic desensitization and counter-conditioning can be our first best steps to building the trust we need to teach effectively. A trusting relationship is operationalized as one in which an animal approaches the trainer without hesitation, even in ambiguous situations, which is the result of a high rate of positive reinforcement across a wide range of conditions.

So, as to the question of who's on whose shoulder, Pavlov on Skinner's shoulder, or vice versa, one answer is, "It depends." But, maybe a better answer is, "That's why we have two shoulders." Since both learning systems are engaged all the time, a strict dichotomy to separate them

may not be so useful after all. We can buy a bigger toolbox and keep all our best training practices at hand: Systematic desensitization, counterconditioning, setting events, motivation operations, positive reinforcement, shaping, differential reinforcement of incompatible behavior – we may need Mary Poppins' endlessly expandable carpet bag instead of a mere tool box.

One Toolbox?

Recent research by Donahoe and Vegas[6] suggests a unified principle of learning, perhaps adding to the soundness of a one-toolbox approach. When eliciting pigeons' swallowing responses, they found that the neutral stimulus became a CS regardless of the order of presentation of the unconditioned stimulus (water injections) and the neutral stimulus (colored light). From those observations, the researchers concluded that it is the contact between the neutral stimulus and the *behavior* that accounts for conditioning of a CS. This is aligned with our account of operant learning, which focuses on the contiguous contact, the contact between behavior and consequences.

Donahoe[7] explained, "Our view is that Pavlov and Thorndike identified two different procedures for the study of learning, but that the two procedures have different outcomes that are nonetheless, expressions of the same fundamental conditioning process." As research consumers, we now wait for replications and extended application to determine the validity and relevance of this finding to training. Like behavior itself, science moves, which means we need to stay on our toes.

A unified principle makes sense when considering the commonalities between a respondent CS and an operant S^r (conditioned reinforcer), both of which acquire their behavior influencing strength by being paired with a US-UR or B-S^R (behavior-unconditioned reinforcer), respectively. Neutral stimuli can also be conditioned effectively by pairing with other well-established conditioned stimuli, a process known as higher order conditioning. Higher order conditioning often accounts for so-called irrational fear or phobias. For example, and unexpected spray of water used to shift an animal may result in an animal who is afraid of water, hoses, left-handed keepers, ponytails, and red caps, through higher order conditioning. Shall we call this neurosis or learning? Watch this video and imagine all the many stimuli that could inadvertently be conditioned in this scenario - https://www.youtube.com/watch?v=ijljMeWSOQ0

Poperants anyone? Anyone?

A special class of behavior once known as fixed action patterns was defined as an innate behavior pattern elicited by specific stimuli, like the courtship dances of many bird species. However, as Ha explains, "But then we discovered that they could get better at it, quicker or more discriminating as they grew older: wait, that's not genetic, that's called learning! So the behavior was NOT fixed."[8] I tried to coin a new term for these motor patterns that captured both the innate and flexible features of these motor patterns: poperants. They pop like innate behavior but are modified by consequences. Unfortunately, I can't seem to get buy-in from either of my closest textbook author friends. But, it does highlight science moving again, and the ubiquitous influence of the environment on behavior. Watch this video for an example of juvenile Laysan albatross practicing the courtship motor pattern. Note the observer chick. https://www.youtube.com/watch?v=SqEINsqhE3w

Are You Kidding Me?

A few years ago I heard a speaker describe respondent and operant learning as mechanistic and therefore underpowered for meeting our animal behavior goals. Another speaker talked about so-called brain-based training. I'm a big fan of brain science and no one wants to know what an animal is thinking more than I. However, the main focus of training is changing behavior by

changing conditions. That's the behavioral level of analysis – the level at which behavior and environment interacts. The ultimate proof of the relevance of our contemporary training technology is the overt behavior of the animals we train and the humanness with which we apply the technology.

Trainers all around the world have blown the lid off these limited and sensational notions of operant training by showing the full power of antecedent arrangement and positive reinforcement. When I work with parents, I often show them videos of animal trainers to learn how it's done. Popular assertions that brain networks cause behavior are incomplete without consideration of the environment activating those networks. Layng's description of Goldiamond's constructional approach to clinical psychology is relevant here, he wrote: "One does not run from the bear *because* one is afraid, and one is not afraid *because* one is running from the bear—one is both running and afraid because there is a bear close on one's heels." [9] As designers of learning environments, our eye's on the bear.

The list of great respondent applications is also long and far from trivial. For example, pairing camphor odor with interferon injections to increase immune system activity.[10] We can reduce our description of learning processes without being reductionist this way: Respondent learning is protective and operant learning is purposive. These are two amazing and essential outcomes for the good life. With due respect to the speaker, I suppose a Maserati could be faulted for being mechanistic too.

What a Wonderful World

One thing that continues to nag at me throughout this discussion is the word "conditioning" in all its many forms. As far as I can tell, it is a word that mirrors the cultural fog to obscures how humans and other animals share the ability to learn, and by the very same principles. You know the bias – kids *learn* but animals *are conditioned*. Look carefully at the different construction of those clauses. It's time we drop this distinction. Recent data on animal intelligence certainly supports this change. Did they suddenly get smarter, or did we become observers and teachers?

I've often said that we need an icon to celebrate our commonalities as effective as Noah's Ark celebrates our differences. At the top of the list of commonalities is surely the ability to learn, to change what we do based on the experience of doing it.

It's hard not to get excited by such a remarkable system that facilitates dynamic behavior change in response to an ever-changing environment. The ability to learn is not separate from our nature. *Learning is our nature*. It is our evolutionary history and our current biology. Animals don't do behavior for no effect or to be ineffective. However you want to slice the processes, learning is the mechanism that allows us to be more effective next time. It really blows my mind.

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The Right Tool for the Job

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The move toward more positive, less intrusive training methods has significantly improved the welfare of many animals at zoological facilities. However, positive reinforcement training alone doesn't guarantee welfare benefits for animals in human care. It is sometimes the case that animals have experienced better welfare before the implementation of a positive reinforcement training program.

Recognizing that humans and other animals are individually unique, the right tool for the job should be measured on a case-by-case basis, change with current conditions, and be evaluated using an ethical benchmark.

The AZA Animal Welfare Committee defines Animal Welfare as "An animal's collective physical, mental, and emotional states over a period of time, and is measurable on a continuum from good to poor." Practitioners trained in applied behavior analysis (ABA) are legally held to the least intrusive procedural guideline when changing children's behavior problems. With the AZA and ABA statements above as our benchmarks, this paper will explore animal training and management practices emphasizing how we choose the right animal, trainer, and technology for a variety of common challenges in zoological facilities.

Steve Martin began his professional animal training career when he set up the first of its kind, free-flight bird show at the San Diego Wild Animal Park in 1976. The show gained world acclaim for its unique ability to combine the entertainment of birds performing natural behaviors with inspirational conservation messages.

In 1984 Steve Martin began teaching animal keepers the art and science of behavior change to enhance the husbandry, enrichment, and behavioral management of exhibit animals. He has now served as an animal behavior and visitor experience consultant for about 100 zoological facilities in over 20 countries. Steve is an instructor at the AZA Animal Training School, an instructor at the Elephant Management School in Hamburg Germany, a Trustee with the World Parrot Trust, and President of both Natural Encounters, Inc. (NEI) and Natural Encounters Conservation Fund, Inc. (NECF) a company dedicated to raising money for conservation programs. NECF has now raised and donated well over one million dollars to in situ conservation programs around the world.

Steve Martin has a strong commitment to conservation and helping people understand their relationship with the living earth. The Mission Statement of NEI is "Connecting Humans with the Natural World" and Earth Day is an official holiday for all NEI employees.

Introduction

Animal keepers and caregivers are becoming animal "trainers" as they implement positive reinforcement training strategies to improve the management and welfare of the animals in their care. Animal keepers have shaped and modified the behavior of their animals for as long as animals have been in human care. However, the training techniques they often used relied on force and coercion, rather than the positive reinforcement methods employed by contemporary animal trainers. Today, animal keepers and trainers apply the principals of positive reinforcement behavior change throughout the profession, and they do it at varying levels of competency ranging from very basic, to expert level. A basic level of training skill is often enough to enable a keeper to perform routine management behaviors like shifting animals on and off exhibit. However, expert level skills are required to teach animals to willingly participate in more complicated behaviors, such as advanced husbandry and medical behaviors. Advanced skills are also needed to work with many full-contact program animals without the use of negative reinforcement and punishment.

Evaluation of an animal's suitability for inclusion in training and education programs begins with the understanding that every animal is an individual. What works for one animal may not work with another. Many people fail to grasp this concept as they search for training plans for their particular species of animal with hopes that following the directions will guarantee the perfectly trained animal. Trainers have asked, "What is the best working weight for a Harris Hawk?" Or "What is the best treat to use to teach a gorilla to accept an injection?" No two animals will behave the same, and no one animal will behave the same in every condition.

There are two important benchmarks we will use to help evaluate the right tool for the job. The AZA's Animal Welfare Committee (AZA, 2014) defines welfare as; "An animal's collective physical, mental, and emotional states over a period of time and is measurable on a continuum from good to poor. *Explanation:* An animal typically experiences good welfare when healthy, comfortable, well-nourished, safe, able to develop and express species-typical relationships, behavior and cognitive abilities, and not suffering from unpleasant states such as pain, fear, or distress."

We will also use Dr. Susan Friedman's Ethical Hierarchy of Behavior Change Procedures (Friedman, 2014). In this hierarchy, procedures are organized from least to most intrusive. She wrote:

> Intrusiveness refers to the degree to which the learner has counter control. The goal is to use the procedure that is the least intrusive, effective alternative. The hierarchy is a cautionary tool to reduce both dogmatic rule following and practice by familiarity or convenience. It offers an ethical checkpoint for trainers to carefully consider the *process* by which effective outcomes can be most humanely achieved on a case-by-case basis. Rationale like, "It worked with the last case!" is not enough. The evaluation and behavior change program of every animal should be a study of the individual (i.e., individual animal, setting, caregiver, etc.). Changing behavior is best understood as a study of one."

The Hierarchy includes:

1. Medical, Nutritional, Physical

2. Antecedent Arrangement

3. Positive Reinforcement

4. Differential Reinforcement of Alternative Behavior

5. Extinction, Negative Reinforcement, Negative Punishment

6. Positive Punishment

Medical, nutritional and physical conditions are motivating operations that should be considered and addressed where necessary before starting any training program. Once a keeper knows an animal is fit for training, other antecedent stimuli can be adjusted to make the right behavior easier to perform. This might include limiting distractions, moving various items in the training environment, prompting behavior, and more.

Positive reinforcement is the tool of choice for trainers committed to the most positive, least intrusive form of animal training. In the positive reinforcement training environment the animal has control and can choose to participate or not. When animals learn their behavior is associated with desirable outcomes, they not only behave more, they expand their understanding of the behavior-consequence contingencies, which in turn gives them even more control of their environment and reinforcers. Control is a fundamental goal of the ethical hierarchy and is also a primary reinforcer for behavior (Friedman, 2014).

In differential reinforcement of alternative behavior (DRA), reinforcement is made available for a specified alternative to the unwanted behavior. (Athens & Volmer as cited in Chance, 2014). With a DRA strategy a trainer might use positive reinforcement to teach a chimpanzee to gently hand a stick to a trainer to replace the behavior of trying to poke the trainer with the stick.

Extinction, Negative Reinforcement and Negative Punishment are listed together in the hierarchy and in no particular order of relative importance over one another. These training procedures have a potential for detrimental side effects and can cause unnecessary withdrawals from the trust account with a trainer.

Positive punishment is the last procedure in the hierarchy because this behavior-reducing strategy takes away choice and control from the animal and is associated with aversive stimuli. However, there are times when positive punishment is the right course of action in some situations, especially where an animal's safety or welfare may be compromised if its behavior continues. Positive punishment as a primary training strategy for shaping a behavior is fortunately being replaced by positive reinforcement procedures in most contemporary zoological settings.

The right human for the job

Training animals in a zoological setting is far more than clicking a clicker and giving an animal some food. Today's animal trainer works with multiple species, in a wide variety of training conditions and is responsible for meeting demanding program goals. Considering the right human for the animal training job begins with evaluating a person's skills and knowledge.

Animal training is a relatively young discipline in the zoological community with newly evolving standardization of training procedures. However, the majority of animal caregivers learn training skills on the job, often just by doing it on their own with little or no guidance. The number of zoological institutions with formal behavior management programs is relatively small compared to the number of facilities where keepers are involved with training animals each day.

Directors, veterinarians, curators, and a wide variety of zoological professionals talk of having expert animal trainers at their facilities. However, what education, experience, or knowledge prepared them with the ability to tell an expert from an average animal trainer? Without standards with which to judge a trainer's performance, the title of expert can be used to describe a wide range of training competency. Operationalizing what an expert trainer DOES should be helpful to the zoological community in general.

The following is a list of a few of the most important behaviors commonly observed in "Expert" animal trainers:

Focuses on positive reinforcement

Positive reinforcement is more than giving an animal a treat after correct performance of a behavior. Expert trainers use a vast array of reinforcers, both primary and secondary, and frequently adjust the type and quantity of reinforcers to maintain their reinforcing values. Expert trainers know an animal's life is filled with competing reinforcers tugging at their behavior, and that successful training sessions often hinge on variability, novelty and variety of reinforcers.

Positive reinforcement becomes a lifestyle for expert trainers both with animals in their care and human animals in their lives. Many animal trainers have an outstanding knowledge of the science of behavior change. However, we often see even the most experienced positive reinforcement trainers fail to use their understanding of reinforcement theory in their daily interactions with animals in their care, including the human animals. Expert animal trainers use positive reinforcement strategies with humans in their lives as well as the non-human animals in their care. Rather than catching people doing something wrong and punishing their behavior, expert trainers arrange the environment for success with clear, honest communication and then catch people doing something right and reinforce that behavior. The best leaders are the ones who walk the positive reinforcement talk.

Avoids Punishment

When many people think of punishment they visualize forcing animals to comply with commands through abusive methods. Many people fail to realize that anything they do that results in a decrease in behavior may involve punishment. Even time-outs are a form of punishment, and should be used by expert trainers only. A poorly implemented time out can easily lead to confusion, frustration, aggression and more, which is the reason most advanced trainers very rarely use time outs when training animals. Expert trainers avoid punishment whenever possible, partly because they understand the potential for detrimental side effects such as aggression, decreased behavior, escape/avoidance, and generalized aversion to the environment. Many animal caregivers have asked, "How do I stop the animal from doing that behavior?" An expert trainer asks, "What do you want the animal to do instead?" This empowering approach of replacing unwanted behavior with more desirable behavior using positive reinforcement, sets expert trainers apart from average trainers.

Takes responsibility for behavior

Far too often we see keepers and trainers blaming their animals for poor performance and undesirable behavior. They label the animal as obstinate, aloof, not motivated, messing with their

mind, pushing their buttons, aggressive, scared, and many more labels that do little more than relieve the trainer of responsibility for the behavior. The fact is animals can learn the behaviors we want to teach them. The trainer's ability and strategies that are the most important factors in determining the progress in the training session. Expert trainers avoid blaming their animal for poor performance and instead look inside themselves to reevaluate their skills and strategies to find more successful training tools.

Demonstrates flexibility

Expert trainers know the training plan is not a roadmap; it is a set of hypotheses, predictions about how to get the animal from point A to point B. The animal's behavior provides the feedback that confirms or disconfirms those predictions and leads the trainer to revise what s/he does to accomplish the training goals (Friedman, 2012). Trainers bring only half of the information to the training session and the animal brings the other half. An expert trainer has a plan, but is flexible to change the plan once the animal's behavior provides the critical second half of the information. Some trainers try to force their plan, even when it is not working, instead of adjusting what they do in response to the animal's' behavior.

Carefully arranges antecedents

The condition in which training occurs varies from minute to minute and antecedent stimuli can make or break a training session. Some of these antecedent conditions cannot be predicted or controlled, such as unexpected sounds, the appearance of a new person, or weather conditions. Some antecedent conditions can be influenced or adjusted by trainers to prepare the environment for the best learning experience. Expert trainers evaluate and adjust antecedents to promote desirable behavior.

An expert animal trainer looks at the training environment much like a professional quarterback looks at the field before the snap of the football. Each little detail is observed and then adjustments are made before any action takes place. Where some trainers might blunder in, oblivious to the behavior of the animal, an expert will carefully observe the setting events and make adjustments. The position of the stool in the den, the sun shining through the window, the proximity of the trainer and others in the room, no small detail goes unnoticed and adjusted to promote ease of behavioral performance.

Carefully arranges consequences

Where careful antecedent arrangement sets the field of play to promote desirable behavior, consequences move behavior downfield. Expert trainers are highly skilled at adjusting consequence to increase the future behavior. They constantly evaluate the reinforcer's affect on behavior and make adjustments in rate and value to increase motivation. Advanced trainers use high rates of reinforcement to increase attention spans, add trust to the account, and promote clear behavior-consequence contingencies. Expert trainers also use a myriad of reinforcers, both primary and secondary, to establish and maintain behavior.

Practices two-way communication

Expert trainers are skilled observers of animal body language and give the animal a strong voice in their relationship as they form a two-way communication system. They establish partnerships with animals instead of trying to dominate or force animals to perform behaviors.

Through careful observation of an animal's body language a trainer can empower the animal with a level of control in its environment where its "voice" (through its body language) is as meaningful as the trainer's voice. A trainer gives a cue for the animal to perform a specific behavior, then the animal's body language feeds back information to let the trainer know if it is motivated to participate or not. If the body language shows the animal is not motivated, the trainer can change the antecedents to encourage the animal, or stop the training session and try again later. When cues and criteria for behavior are clear, animals learn quicker, rates of reinforcement go up and motivation increases.

The most successful animal trainers are often the ones who are the most sensitivity to animals' body language. As a trainer approaches an animal's enclosure there is an important opportunity for the trainer to observe the animal's body language and determine the speed of approach, or if approach is even advisable. Too often, keepers just march up to a training area with little or no concern for what the animal's behavior might be telling them. Expert trainers never invade an animal's personal space until they are invited in by the animal's body language.

Uses the most appropriate bridging stimulus for the conditions

Many trainers have said things like "I tried clicker training and it didn't work," or "We haven't started our training program yet because we don't have a clicker." Expert animal trainers know there is no magic in the clicker; it is simply one of the many bridging stimuli available for trainers to use to precisely mark a correct performance of a behavior. Clickers are great event markers in many conditions. However, in some conditions a whistle, verbal, visual, or even a tactile bridging stimulus might be a better tool for the job. For instance, when training great apes or carnivores through barriers, some trainers find a verbal bridging stimulus can be a better tool than a clicker or whistle. The verbal bridge frees up the trainer's hands to hold targets, give hand cues, and deliver reinforcers. Plus, without a whistle in the mouth it is easier for a trainer to give verbal cues, prompts and bridging stimuli.

Whistles and clickers can be effective bridging stimuli when an animal is working away from a trainer, or in a crowed or noisy environment where a trainer's voice may not be heard. Visual bridging stimuli, such as movement of the hand or even turning the body or walking a certain direction can be strong bridging stimuli for animals across an exhibit that are taught to hold on a particular station until a visual bridge is given. Tactile bridges are good communication tools when animals are in close proximity to the trainer and not looking at the trainer, such as when a chimp performs a back inspection behavior, or a sea lion has its head underwater but its body is near the trainer. Expert animal trainers use the most appropriate bridging stimulus for the animal and current conditions.

For various reasons, some trainers routinely thin the pairing of the bridging stimulus with the back-up reinforcer by presenting the bridge after each correct performance of a behavior but only providing a back-up reinforcer for some of the behaviors. For instance, the animal may perform three behaviors at the desired criteria and receive a bridging stimulus for each behavior but receive food only after the third behavior. This is a very common reinforcement strategy in the zo-

ological field, and it is also one of the most confusing reinforcement strategies for the animals. Animals trained with this type of inconsistent pairing of bridge and back-up reinforcer often lose motivation to participate in the training session, exhibit a high level of incorrect responses to cues, and even show frustration-induced aggression. When this happens trainers often blame the animal instead of recognizing it was the low rate of reinforcement that caused the problems. By placing the blame on the animal, trainers try to relieve themselves of responsibility, but miss valuable information about how to increase motivation through clear communication and high rates of reinforcement.

Some trainers believe since the bridge is a reinforcer for behavior they don't have to provide a back-up reinforcer. They incorrectly call this a "variable schedule of reinforcement." However, if the bridge is truly a secondary reinforcer (as evidenced by its ability to increase or maintain behavior), the trainer is using a continuous schedule of reinforcement. The inconsistent pairing of the bridge and backup reinforcer is actually a respondent extinction trial (i.e., delivery of the conditional stimulus without the subsequent unconditional stimulus). Just as Pavlov paired the bell ring with meat powder to elicit salivation in the dog at the sound of the bell, trainers pair the sound of a clicker or whistle to create similar reflexive behavior in animals they train. When Pavlov stopped giving meat powder after the ringing of the bell, the dogs eventually stopped salivating at the sound of the bell.

When trainers break the pairing of the bridge and the back-up reinforcer, animals eventually stop listening to the clicker, whistle or other audible marker, and begin to focus on the most salient information associated with impending reinforcement, which is the action of the trainer's hand moving to the reinforcer. This visual bridging stimulus often replaces the audible marker and keeps the animal in the training environment a bit longer, usually only until the low rate of backup reinforcement reduces motivation and the animal either leaves the session, shows aggression, or the behavioral response deteriorates to the point the trainer ends the session.

Expert animal trainers understand the bridging stimulus has value "conditional" on its pairing with a back-up reinforcer. They seize each opportunity to provide high-value reinforcement, primary or secondary, to keep animals engaged in training and promote the most productive learning environment.

Fades prompts

Prompts are antecedents that help guide or encourage an animal to perform a behavior. Prompts can be body movements, target poles, vocal encouragement, food tossed into crates or holding areas, etc. It is common to see keepers calling animals, showing food items to lure animals, throwing toys into stalls, etc., to get animals to shift on or off exhibits or perform other behaviors. Prompts should be faded quickly in the shaping process to help the animal understand the cue-behavior-reinforcement contingencies. Expert trainers fade prompts quickly, often after just two or three approximations, to let the reinforcers become the key influence on future behavior.

Demonstrates commitment to welfare

Animal training at the highest level involves the artistic application of scientific principles. To achieve expert level takes years of experience, dedication and practice. Fortunately, the number of expert trainers in the zoological world is growing rapidly, which is certainly a boon to animal

welfare. However, there is still much progress to be made.

Some of the most challenging animal training practices are in the full-contact program animal areas. Where most animals trained in zoos, aquariums and aviaries, participate in non-contact or protected-contact training environments, program animals are more likely to be trained in full-contact conditions where they are held or restrained in some way during presentations. Inherent to restraint is the use of negative reinforcement and punishment to influence behavior. These aversive approaches are often associated with detrimental side effects like escape/avoidance, aggression, apathy, and phobias.

An important difference between training full-contact animals and protected-contact animals is in the level of control the animal experiences. When training great apes, carnivores, or any animal behind barriers, the animals have the ability to leave the training session at any time. When training and presenting most full-contact program animals, such as raptors, small mammals, reptiles, etc., the animals are most likely restrained with leashes or held in the hand in some manner, reducing the animal's control in the environment. The challenge then is to balance the educational program goals with the welfare needs of the animal. This is a job for an expert trainer.

Following Friedman's ethical hierarchy of most positive and least intrusive approaches to behavior change is the first step toward improving performance and welfare of program animals. The trainers at Columbus zoo use positive reinforcement to teach their mammals (from kinkajous to wart hogs, to cheetahs) to voluntarily step into their harnesses and wait for the trainers to synch the straps. The animals have also learned to walk next to the trainer's side through the park with a slack-leash used only for safety and not for directing the animal through aversive pressure of the leash.

Bird trainers all over the world are transitioning away from the use of jesses to restrain birds on a glove. They are moving toward giving the animals more choice and control by replacing the negative reinforcement related to jesses with variable duration schedules of positive reinforcement to teach birds to sit on the glove for long periods of time. Trainers are also adjusting their programs to let birds and other animals sit on perches, stumps, or even in trees instead of being secured to a gloved hand as the presenter delivers educational messages.

This move toward positive reinforcement training strategies increases animal welfare, but requires higher skills than the more traditional style of handling some program animals using negative reinforcement. Many program raptors have learned to sit on the glove to avoid the aversive stimuli associated with being caught up by jesses and hanging upside-down when they attempt to fly off the glove. This traditional style of presenting raptors is relatively easy to teach to a keeper or docent, and most raptors will eventually learn to sit on the glove to avoid the aversive stimuli. However, this form of training does not eliminate behavior, and most raptors will continue to bate, or try to fly off the glove, during presentations. The struggling bird not only experiences stress, but also presents potentially detrimental non-verbal messages to guests watching the program.

Teaching a bird to sit on the glove is not difficult for an experienced trainer with a good relationship with the bird. Reinforcing small approximations of longer duration of sitting behavior is a basic strategy that most expert trainers can easily understand and apply. With each reinforcer, the trainer adds trust to the account he or she has established with the animal. Generalizing the duration behavior to new environments is the final step of the process that might normally take an expert trainer only a few days to accomplish.

Again, teaching these behaviors is fairly straightforward for full-time, experience trainers.

However, docents or volunteers who work only a few days each month are often the ones handling the program animals. Volunteers provide extremely valuable services for zoological facilities, and many education programs have come to rely on them to maintain their current level of programming within their budget constraints. However, working a few days a month is diametrically opposed to the consistency required to establish trusting relationships and training skills that are the foundation of positive reinforcement training programs.

The question for zoological facilities looking to improve the welfare of program animals is far more complicated than asking if it is best for docents or full-time staff to handle and train the animals. Surely there are many docents and volunteers with better relationships and training skills than some full-time keepers or trainers. The most important question should be, "Does this particular person have the skills required to create the relationship, and use the most positive, least intrusive form of training with this particular animal in these conditions?"

The right tool for the job – Animals

Animals in zoological facilities fall into two main groups: exhibit animals and program animals. Program animals participate in educational presentations, such as shows, demonstrations and outreach. Exhibit animals are taught to participate in husbandry and medical procedures, and may also participate in keeper talk programs were they are taught to perform species-appropriate behavior for interpretation to the guests at the facility. The focus of this section is on program animals and their participation in educational programs.

When acquiring any animal, it is always best to first consult with experts who have successfully raised and trained the species you are considering. Keep in mind that behavior is a study of one. Just because one zoo has a calm kinkajou in their program that never shows aggression, does not mean that all kinkajous will not show aggression. No matter what the species you are considering, seek out experts who have worked with them successfully, and speak to as many people you can find to learn from their experience. You should research the species' suitability for use in programs as a youngster as well as after maturity, keeping in mind there will be considerable variability in individual animals within all species. Consider the cradle to grave commitment and ask yourself questions about the animal's future, such as, what happens to the animal if it doesn't work out for your program? Will the animal participate in SSP and other population management programs? Will the animal be housed with conspecifics or alone? Will housing be available, and will there be a commitment to welfare for the rest of the animal's life?

<u>Hand-raised or parent raised?</u>

There are many animals, hand-raised and parent-raised, available to the zoological community for use as program animals. Though generally considered better breeders, parent-raised animals often require more time to train and a more experienced trainer to build trusting relationships that promote good learning environments. Though hand-raised animals are generally more tractable and make better program animals, at least when they are young, there are a few detrimental side effects that may result from hand rearing. These behaviors include aggression, extreme vocalizing, bonding to one person and avoidance or aggression to other people, just to name a few.

Corvids and owls are best suited as program animals when they are hand-raised. Many keepers, educators and trainers have attempted to train parent-raised corvids and owls for use in

their programs. Often these birds have come from rehabilitation projects and are non-releasable. Well-meaning curators, directors, veterinarians and others believe they are doing the birds a service by taking them from the rehabilitation facility and bringing them into their education department. However, these parent-raised and non-flighted birds rarely adjust well to life in an education program and may experience unacceptable levels of stress, even when handled by expert trainers.

One quick and easy way to tell if a bird is experiencing stress is by observing its body language. When a bird attempts to avoid a person as he or she approaches, it is possible the bird is already experiencing some level of stress. If the person blocks the bird's attempt to flee and forces the bird to step onto the glove, there is a higher likelihood that the bird will experiences some level of stress. When a bird bates, or tries to fly off of a gloved hand and is caught up by jesses, the level of stress rises. Birds that are forced to step onto gloves, or are restrained when they bate off of a glove, experience loss of control in the situation. Loss of control is often associated with reduced welfare. This is not to say that every time a bird bates off a glove its welfare is compromised to the point it should be taken out of the program. However, it is to say that every time a bird bates off the glove the trainer should recognize the potential for reduced welfare and take action to teach the bird to sit on the glove using positive reinforcement training.

Hawks, eagles and falcons are generally better suited as program animals when they are parent-raised. Even though parent-reared birds can take longer to adjust to working with humans, their behavior later in life is generally more acceptable than their hand-raised counterparts. A hand-raised hawk or falcon can easily develop loud and incessant vocalizations that may last into adulthood. A hand-raised hawk can also establish aggressive behavior directed at humans which can be extremely dangerous. Many trainers have received puncture wounds to the face, hands and arms from hand-raised hawks. Parent-raised hawks, eagles and falcons are generally better than their hand-raised counterparts.

Parrots

Hand-raised parrots are easier than parent-raised parrots to work with when they are young, but may be more likely to develop behavior problems as they mature. Hand-raised parrots can bond with human caregivers, which often results in the bird becoming aggressive to all but the preferred human. An expert trainer can often reduce the amount of aggression, and generalize approach and step-up behaviors to other humans. However, this level of training requires keen insights and expert training skills. Parent-raised parrots can be more difficult to work with in the early stages of training and may take longer to establish trusting relationships with trainers. However, they are less likely to exhibit fluffy, food-begging, clinging type of behaviors that are often seen in hand-raised birds. Parent-raised parrots may also be less likely to bond with one person, and be aggressive to other humans later in life than a hand-reared parrot.

It is often the case that zoological facilities accept donated parrots to add to their program animal collection. These previous companion animals often come with behavioral problems that have led to the owner's decision to part with the bird. These problems are generally associated with biting and loud vocalizations that have often been inadvertently reinforced by the human caregivers. It is certainly possible to replace these unwanted behaviors with more desirable behavior. However, it takes time, dedication and skillful training to deal with many of the common problem behaviors.

Many people have tried to train parrots to participate in free-flight behaviors only to find

that the parrot does not have the skills and confidence to fly. Many, if not most, parrots in educational programs grew up with their wings clipped in their first year of life. With this flight impairment, the bird did not acquire the flight skills during this critical stage of their life. Crashing to the ground punished their attempts at flight and therefore most of them stopped trying to fly. Later in life, when an educator decides to train the bird to fly in the program, the bird refuses to fly even though the bird's wings have completely grown in. Although the bird has the physical ability to fly, it does not have the confidence because flight is a skill it never learned during its developmental period. This is similar to a person learning to ride a bicycle at the age of 40 after never having the opportunity to ride a bicycle when he or she was young. It is certainly possible for the 40 year old person to learn to ride the bicycle, but it will take much longer and require more dedication and effort than a youngster learning to ride a bicycle. Teaching a parrot to fly later in life is an extremely difficult process requiring an expert trainer and usually several months of daily training.

Jesses

Jesses, or the leather straps on raptors' legs that prevent them from flying away from a trainer's gloved hand, have been used successfully on raptors for hundreds of years. However, recently people in the zoological field have begun using jesses on a wide variety of birds, from woodpeckers to cattle egrets and even chickens. Unfortunately, the use of jesses on non-raptors can be dangerous. Few birds have legs as strong as a raptor and can withstand the strain of jesses on their legs. The International Association of Avian Trainers and Educators (IAATE) has published a position statement that strongly recommends jesses be used only on raptors.

Conclusion

The move toward more positive and less intrusive forms of animal training has empowered caregivers with management and health care tools that improve the welfare of their animals. However, the skill level of practitioners in this relatively young field of training in the zoological world varies greatly. To keep pace with the evolving technology, keepers and trainers should increase their knowledge and skills associated with the most contemporary animal training practices. Managers and supervisors should also expand their knowledge of the science of behavior change and develop criteria with which to evaluate the skill levels of trainers at their facilities. Evaluation of trainers' skills should be based on observable training behaviors in conjunction with knowledge of scientific principles.

Each animal brings to the training environment its genetic makeup and personal learning history. When considering an animal for inclusion in a training program, especially one that involves full contact handling, the animal should be evaluated as an individual instead of using species generalities. Considerations should also be given to the condition in which an animal was raised and how that may influence its ability to participate in educational programs.

Not everyone will become an expert trainer, and not every animal will be the best for every job. However, through a commitment to the most positive and least intrusive training methods everyone can contribute to improving the welfare of animals in their care. Avoiding force and coercion and teaching animals to willingly participate in handling and training programs is the moral compass that should guide the behavior of animal care professionals.

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Lunch and Learns

Terminology Tumult

Susan Friedman, PhD
Behaviorworks.org



What do negative reinforcement and positive punishment have in common with jumbo shrimp and clean dirt? What's the difference between a NRM and an S-delta? Is behavioral momentum a procedure or a measure? Why do we need LRS when we already have a time out? If terminology tumult is giving you a headache, get relief fast with this Lunch and Learn!

Susan G. Friedman, Ph.D. is a faculty member in the Department of Psychology at Utah State University. She has helped pioneer the cross-species application of behavior analysis to animals, using the same humane philosophy and scientifically sound teaching technology that has been so effective with human learners. She has written chapters in three veterinary texts, and her popular magazine articles have been translated in 11 languages (www.behaviorworks.org). Susan also writes a blog for Psychology Today (www.pyschologytoday.com). She has given seminars on learning and behavior at conferences and zoos in many countries around the world. Teaching her on-line class for professionals, Living and Learning with Animals, has provided even wider dissemination of effective and humane behavior change practices.

Did you say negative reinforcement and positive punishment? Sounds like jumbo shrimp and clean dirt, right? What's the difference between a NRM and an S-delta? Is behavioral momentum a procedure to increase responding or a measure of resistance to disruption? Why do we need LRS when we already have time out?

As a behavior analyst, I have been asked to define the terms above many times and I've answered them to the best of my current knowledge. I've also had many occasions to ask trainers, "How do you define that term?" and, "What does that procedure look like?" Warding off the risk of one falling in love with one's own definitions, I think it's time to come to the table to review our dictionaries and come to consensus as best we can about what we want the terms mean and the procedures look like.

There's nothing new about this problem, which has been going on a lot longer than 2006

when I wrote the article, Terminology Tumult (see www.behaviorworks.org for the original article and a Spanish and Swedish translation). However, largely due to the world flattening effect of the Internet, the opportunity for confusion among colleagues is ever greater. The fallout from ambiguous terms and variable definitions goes beyond unfortunate or frustrating miscommunication among colleagues. It's also an obstacle to training the next generation of professionals and reduces our effectiveness disseminating to society at large, this important information about effective, humane behavior change. Additionally, a well-elucidated professional language can add to the standards and credibility of a profession. Imagine going to a surgeon that calls your liver a spleen. Finally, animals lose when our procedures are not clearly understood and consistently implemented.

Ironing out this terminology tumult opens big new vistas for collaboration and increased efficacy once we roll up our sleeves, dig in, and develop a common technical language. Consider the clarity gained by the convention of using Latin nomenclature to identify animals in biology. Although Americans say blue and gold macaw and the British say blue and yellow, the name *Ara ararauna* puts any confusion to rest. Let's capitalize on the kind of clarity with training terms.

Some Terms on the Table: More Wanted

The 25 terms below (compiled with help from the awesome Lunch and Learn audience at the ABMA 2014 Conference) have been known to cause communication break down. Like all word lists, this one is a living document, which we can expect will change and need refinement over use and time. Feel free to add to the list and hope to see you at the discussion table soon.

Construct vs. behavioral description

Respondent vs. operant behavior

Elicited vs. emitted or evoked behavior

Trigger vs. cue

Aversive vs. adverse

Prompt vs. cue

S-Delta vs. NRM

Motivating operation

Non-contingent reinforcement

Reward vs. reinforcer

Positive vs. negative reinforcement and punishment

Primary vs. secondary reinforcers

Continuous vs. variable schedule (relative benefits of using)

Variable schedule of reinforcement vs. variety or reinforcers

Extinction vs. elimination of problem behavior

Chain vs. sequence of behavior

LRS vs. time out

Behavioral momentum (Nevin vs. Mace)

Redirected aggression vs. displacement behavior

Conditioned emotional response

Baiting vs. luring

Free shaping vs. shaping

Conditioned vs. conditional stimuli

Self-reinforcement vs. automatic or intrinsic reinforcement

Lunch and Learn Descriptions

Each Lunch and Learn will be an hour long discussion based on the topics below. They were an opportunity to share with and learn from peers. Groups met in various rooms where they were able to ask questions, problem solve, and perhaps gain insight into their animal's behavior. There was a moderator for each topic to keep the discussion on topic and on time.

Terminology Tumult

What do negative reinforcement and positive punishment have in common with jumbo shrimp and clean dirt? What's the difference between a NRM and an S-delta? Is behavioral momentum a procedure or a measure? Why do we need LRS when we already have a time out? If terminology tumult is giving you a headache, get relief fast with this Lunch and Learn!

Aggression

At some point in a career, you will encounter aggression. There are many strategies that can be used in your tool box to minimize aggression. Come see what tools your peers use to deal with aggression.

Animal Group Dynamics

Working with a group of animals can be difficult. Not all individuals will be on the same page at the same time. It is not always possible to separate them out either. Get ideas on how to problem solve the issues so that training can occur.

Medical Behaviors

Training has become the tool we use when animals need a medical procedure. It has become more common place to have animals trained for voluntary injections, ultrasounds, blood draws, etc. That does not mean that the problems training these behaviors has become less common place. This group will discuss successes and challenges in training medical behaviors.

Cooperative Feeding

Animals are not always the best at sharing, particularly when it comes to food. There are times when one animal may be on a diet, need medication, or simply need to be able to eat their diet without confrontation from others. Perhaps one of your peers has a successful solution to making life easier or you have had a success you would like to share.

Domestics and Pets

There is a wide variety of training that occurs in the domestic world. It spans service dogs to therapy horses to personal pets and beyond. This group will discuss training and behavior issues with domestic animals from service animals to pets.

Carnivores

There are many challenges that may come about when training animals that might want to eat you. This discussion may cover issues such as quickly training a behavior when you have fast days in between, how to train when the animals appetite decreases due to seasonal or hormonal changes, etc.

Primates
Many primate keepers get outsmarted by the charges on a daily basis. Come commiserate with those that would like to train smarter. Come talk about strategies to make this possible or any other primate related behavior issue.

Hoofstock
Many great advances are being made in the behavior world with hoofstock. Where previously animals may have been labeled as "skittish", keepers are now able to bring foreign objects in to provide better care. This is just an example. Your peers surely have many more for you to discover.

Marine Mammals
Here we go again with those smart animals! There are so many challenges to overcome that start with the fact these animals live in a different than humans. Come share successes and strategies in working with these intelligent animals.

Birds
There are many different ways that training is used with birds. Many include those birds that are in demos, shows, or education departments. There are

Zookeepers with Domestic Animal Business
Zookeeping is not the career to get rich on. Many zookeepers have started a side business training domestic animals. There are some ideas that can help translate the training from one business to the other. Come learn how to balance both.

Enrichment
There are always new ideas out there in the world of enrichment! Come find out what new inspiring ideas your peers may have discovered.

Team Work
Training does not occur in a vacuum and many times multiple trainers work with one animal or on one specific behavior. There are many challenges to working with different personalities and styles. Along with those challenges, your peers will also have some secrets to being more successful.

Demos/shows
Demonstrations and shows add another human factor to the training. It is also puts your training out there for everyone to see. Come see how your peers have overcome these hurdles.

Shaping Plans
It is easy to do the training, yet not so easy to do those training plans. An effective plan can make training more efficient. Come up with better ways to make your plans work better for you.

Lunch and Learn Summaries

Working with Aggression

Jeremy Dillon

Three scenarios were discussed. All three of these seemed to have a common theme. "This animal has been labeled as aggressive, but I don't want it to be that way".

- A Harris Hawk that would fly at the enclosure door when keepers approached.
- A maturing female Sea Lion that was partially blind and developing some biting habits.
- A big cat that would attack the fence when certain people approached.

Problem Solving

Heidi Hellmuth

For the problem solving Lunch & Learn I started with a brief review of some problem solving methods from a presentation I did at a workshop years back, which took 5-10 minutes. Then it was opened up to the group to either share their problem-sharing methods or problems they wanted the group to assist with. We had 2-3 problems that the group brainstormed about.

Domestics and Pets

Megan Phillips

- We started by asking how can we help more owners to do training proactively rather than re-actively?
- Discussed that veterinarians are positioned to be great front line promoters of training.
- Developing relationships between vet & behavior world is critical
  - -Sophia Yin's model of using revenue generating & cost-cutting behavior programs hosted by vet clinics.
  - -Have to explain and demonstrate how behavior programs help the vet clinic, esp. bottom line.
  - -Behavior programs can be headed by technicians and other clinic staff - taking pressure off of the vet who is often the doctor & business owner
  - -Using videos and live demos will show vet and clinic managers the benefits up front
  - -Scaling goals down will help to make prospect less overwhelming - e.g. start by picking 1 goal/1 staff person
- Dr. Brown had some good notes about speaking with vets about "low stress" handling. Important to be sensitive to vet's experience and education. The methods they are currently using were likely taught as best practices and least stressful based on era and school of education, even though we may recognize lower stress alternatives.
  - -Only 9 vet schools even teach about behavior.
  - -Can be a turn-off if approached the wrong way.
- Dog trainers in our group regularly recommend that students bring dog to vet regularly for "happy visits"/non-treatment visits. Good for dogs but can also help build relationship with clinics.

- Dr. Brown discussed a project currently in the works with a P.R. element headed up by Dr. Marty Becker regarding bringing changes to the veterinary industry to move toward promoting "fear free" handling.
    - -Goal is to develop criteria & training for "fear free" handling certification.
    - -Heather brought up possibility of ABMA offering endorsement/organizational backing & support to this effort.
- For dog trainers to help encourage more proactive training:
    - -Suggestions were to incorporate teaching more "fun stuff" than just basic obedience cues in intro classes
    - -Use client profiles during registration to tailor specific types of "fun" games etc. to add on, e.g. nose work
    - -Catch dog's talents and teach behaviors accordingly - will be more likely to be quick & fun and inspire

Carnivores

Janet Rose-Hinostroza

We had a large group with good questions and great information sharing. Subjects included:

- IBD (irritable bowel disease), which folks experience it in which animals, how to treat.
- An exhibit tiger that attacks its own reflection in the glass. Great suggestions to change the glare and reflection without disrupting viewing.
- Fast days. Why? Pros and cons.
- Bones. What types? How often? Pros and cons.
- Fossa diets and behavior. Favorite items.
- Kibble in diets - pros and cons.
- Sensitive and elderly animals (cheetahs), herpes, how to minimize issues.

Suggestions for another or later discussion:

- Large team 13 individuals (6/7 per day), 34 animals free contact, 12 potentially lethal or capable of serious injury.
- Consistency - Frustration – Aggression
- Feeding techniques (sloppy feeding leads to aggression). Latent bridging and reinforcing leads to animals ignoring your "signals" and reacting to body language.
- Aggression is just another form of communication. If this is the form of communication our animal is choosing, perhaps we are not doing a great job as a Trainer.
- Consider medical (pain), social, hormones, diet, and environment. (Antecedents)
- Safety
- Species specific behavior and individual behavior
- eye contact with cats
- respond to the individual animal that is unique (superstitious)
- How to be successful working with carnivores (and probably avoid aggression).
- Develop a positive relationship being consistent with others (observe, note, repeat with coaching, "perfect") Feeding, playing, relating w/ another Trainer, being present.

- Rehearse your moves and sessions without the animal (cue, criteria, bridge, reinforce). Get familiar with equipment (from clipping the collar and leash to opening the door). Plan your sessions. Observe a Trainer do a session w/ the same cues, criteria, consequence - observe the way they interact - have the Trainer crate the animal and you take over.
- Video yourself and others
- Take stock in the time building a relationship (believe the value in it). Daily husbandry, back up, observing others, building relationship, move from neutral to positive.
- Control behaviors to start a session (animal choice, acknowledge the animals response to session and you - don't get surprised!)
- DRO/DRI
- Strong crate behavior (safe place), exit strategy, strong team, handing off the leash.
- Progression that makes sense behind the scenes, informal, formal, PR...

My opinions:
1) Act like prey become prey (not be "dominant" - but be confident)
2) Be aware of your animal and ask yourself "what's he thinking" try to see the world through their (perceived filters). Length of leash for Amara leashing.
3) Never work alone. Don't get complacent - even in "protected contact". (Polar bear)
But we are human, prone to mistakes, prone to complacency in our routine - this is why you need a partner and this is why you need to remind yourself every day that you bare a responsibility to the "safety" and "longevity" of our profession.
One incident can change everything - it's a huge weight to bare.
4) Be disciplined.
5) Train for a team approach (disciplined, repeatable behavior and relationships) mark and collar versus just go in and collar. Station before entering pen. Does your relationship cause the animal to discriminate against others?
6) What's the acceptable level of relationship with this animal - the lowest or highest common denominator (depending on how you are looking at it), Trainers need to be comfortable with X, most important for animal to do X - who can mimic this consistently without causing the animal frustration.
What's the animal's carrying capacity?

Primates

Jen Hickman

We discussed problems, enrichment ideas, and successes. Throughout all of the discussions we agreed that there is never enough time *not* to train. Often times we can save ourselves time in the long run with training.
Training Problems:

- A gibbon won't cross over to another island
  -Solution: Create a bamboo bridge
- Chimp Intros
  -Solution: Pair howdying with training and cooperative behavior

- Shifting a group of young boy colobus
  -Solution: Give less attention when shifting and more after they have successfully shifted
- A female gibbon is aggressive if the male gibbon gets more attention
  -Solutions: Give them an alternative behavior
  -Give her double treats or extra attention
  -Reward calm behavior

Enrichment

- A board that has pictures on it can enrich great apes by having them name the pictures
- Bamboo swings
- Peanut puzzle feeders made out of PVC pipes
- Puzzle feeder: Grey lexan with 1 ½ inch PVC on back. The tubes can be moved around to make a forage board
- Excel program that randomizes enrichment by category and type

Successes

- A palm cockatoo that bit up a keeper was trained for voluntary wing clipping
- A chimp that was afraid of the scale when it pressed down was trained to sit on the scale by sitting on a crate on the scale. The chimp was even trained to bring the crate to the scale.
- Another chimp was trained for cardiac ultrasound. The ultrasound showed that the medication was working. They were unable to do this under sedation.
- At another facility a chimp was implanted with a cardiac pulse monitor so that they could see what a normal rhythm was for him.

Hoofstock

Amy Schilz

Discussions:

- Trouble with shifting
- Greatest training successes with hoofstock that others can learn from
- Enrichment
  -Favorites
  -Successes
- Training an injection behavior
- How to station hoofstock on exhibit for shifting purposes

How to fade out negative reinforcement

Marine Mammals

Christa Gaus

Discussed the aggression of a sea lion and various things to decrease it given a challenging set up

- Multiple animals in the pool
- No holding space or ability to separate out
- Currently a single animal is fed by a single trainer though they are working on trainers being able to feed more than one animal at a time to allow for more training that may require multiple people with an animal.

Solutions suggested:

- Evaluate diet to see if the aggression which seemed to come mainly at the end of a session was hunger related
- Train an incompatible behavior
- Reinforce with extra treats after a session if no aggression occurs.

This brought up the discussion of how to deal with management that isn't always helpful in looking for a solution to a problem that puts the trainers in an uncomfortable position. Basically the suggestion there was to make it seem as if changes you want to make to a training program or set up is in the best interest of management to save on time, staff, and or money. Less injury/ accidents can mean less workman's comp!

Zookeepers with a Second Business

Heather Leeson

From the zookeepers w/ 2nd job, there were 10 attendees. One had a photography 2nd job, a few had K9 2nd jobs, & several were just interested in how to get started in the animal field.

In regards to starting a second business:

- There is free help to start your own business. Find your local small government center, visit www.sbdc.gov or visit your www.state.gov site.
- Advertising your business seems best by word of mouth & social media- Facebook (pictures speak volumes) and Linked in.
- Google offers grants. Probably a lot of effort, but could be worth looking into.
- Learn to be a salesman! Your product (stellar training) will speak for itself but you have to sell it to the public, vets, shelters, & local businesses. Be professional and courteous, have great customer service and you will soon have a great reputation.
- For those feeling apprehensive advertising themselves as a professional dog trainer (with limited experience), try volunteering at a shelter or kennel club training dogs. You will gain experience and build a good reputation. You can also find a mentor and train with another trainer.
- Document everything for tax purposes! Mileage, training supplies, educational endeavors, etc.

In regards to K9 classes that are profitable:

- Puppy, beginner, Rally, board & train.
- Classes are 4-7 weeks, depending on the class.

What is most difficult?

- Being a salesman
- Selling advanced classes (canine good citizen)
- Expanding into a physical address (actual building to pay rent)
- Offering other services besides training (grooming, boarding, and daycare).

BMF Travel Scholarship Winner

Tall List in Short Order: Developing a Positive Reinforcement Based Cheetah Training Program to Meet Programming and Collection Management Goals

Justin Garner, Antonio Ramirez
Busch Gardens Tampa

In *2011, Busch Gardens Tampa opened a dynamic cheetah exhibit and presentation area, Cheetah Run. The mission was to set a new benchmark in animal training, management, and conservation, as well as to connect guests to wildlife in exciting new ways. A team of trainers were tasked with developing a training program that would consistently satisfy seven main objectives: conditioned husbandry behaviors, daily lure runs, free contact cheetah/trainer presentations, sustainable breeding, maintaining long-term compatibility within social groups, and exhibit cheetahs. These goals were set for the entire collection of cheetahs. Most of the animals needed to be proficient in leash-walking, lure-running, and conditioned husbandry. The animals' experiences range from young naïve animals to older animals that were averse to most of environmental stimuli, including people. The cheetah collection consisted of both hand reared and parent reared individuals. These goals require free and protected contact interactions. We needed all of the animals to be ambassador cheetahs that would exhibit calm behavior in a novel environments. Most importantly, all of the cheetahs needed have behavioral repertoires conditioned through operant conditioning utilizing positive reinforcement to drive all behaviors. The theme park environment comes with its own unique set of challenges. To begin, the entire collection had to be desensitized to environmental stimuli including the coaster that passes above the area, music, large crowds, and even fireworks.*

In this paper we will describe how the fundamental and exclusive use of positive reinforcement was paramount in achieving our goals with the collection in a short time period. Additionally, we will discuss the unique challenges that were encountered, processes that were applied, knowledge gained, and plans for continual growth.

Keywords: cheetahs, positive reinforcement, Busch Gardens Tampa, training, operant conditioning, behavior.

Introduction

Cheetahs (*Acinonyx jubatus*) have long been exhibited in zoological settings. The Association of Zoos and Aquarium's Species Survival Plan currently manages over 250 cheetahs in 54 accredited zoos. Traditionally, cheetah collections have been managed and labeled as either exhibit/breeding animals or ambassador/program animals. Ambassador/program cheetahs have predominately been males. It is generally accepted that female cheetahs cannot be utilized as program/ambassadors because they are predisposed to aggression due to their solitary nature as they mature. Generally, cheetahs that are in breeding programs are not utilized as ambassador/program animals and vice versa.

In contrast to larger felines, it is more common and accepted for trainers to work with cheetahs in free-contact settings. The majority of cheetah behavior management and training programs employ some punitive consequences and or negative reinforcement to condition and maintain behavior in both program and non-program collections. Other programs utilize a combination of punishment and negative reinforcement along with positive reinforcement. Cheetah poles are commonly utilized to create distance and space between cheetahs and trainers as well as to

shift cheetahs between areas. The animals are initially conditioned to move away from the poles and trainers by using the pole to physically move the animal, visually threaten the animal, or to create aversive sounds by hitting the pole on environmental objects.

Once conditioned the cheetah poles are utilized as a safety tool for keepers; allowing them to enter the animal's enclosure to carryout routine tasks without the animals approaching, to move cheetahs from one area to another, or to separate individuals from a group. Other examples of commonly used punishment in cheetah training programs include nose flicks, and leash or collar pulls. Historically, desensitization has been accomplished by flooding the cheetahs with stimuli rather than using systematic desensitization paired with positive reinforcement.

Busch Gardens Tampa is one of twelve parks operated by SeaWorld Parks and Entertainment. The park is a family-oriented theme park featuring up-close encounters with exotic animals, thrill rides and live entertainment. With nearly 12,000 animals representing more than 300 species, the park's zoological collection is a marquee attraction for families, and its world-class thrill rides appeal to all ages. In May of 2011, Busch Gardens Tampa opened a new dynamic cheetah exhibit and presentation area, Cheetah Run. Paired alongside Cheetah Run, is Cheetah Hunt, a first of its kind triple launch coaster that allows guests to feel the agility, power, and speed of the cheetah. The mission of the new zoological area, Cheetah Run, was to set a new benchmark in animal training, management, conservation, as well as to inspire guests by connecting them to wildlife in exciting new ways. Based on the company's animal training history and pioneering animal behavior programs, the cheetah training program was designed and developed to employ operant conditioning solely utilizing positive reinforcement. This training program was intended to achieve and maintain six main goals; a complete conditioned husbandry repertoire, daily lure run demonstrations, free-contact cheetah and trainer presentations, sustainable breeding, maintenance of the long-term compatibility within social groups, and to exhibit cheetahs.

Materials and Methods

Study Site & Subjects:

An initial collection of 13 cheetahs and one domestic dog was acquired from 2010 to 2011. The cheetah's experiences ranged from young naïve animals to older animals with aversive histories. The original collection included 3.2 parent-reared individuals, 0.7 hand-reared individuals, and 1.0 neonate that was in the process of being reared with a rescued domestic dog (*Canis lupus familiaris)*. All of the animals were housed onsite in a behind the scenes area while the new Cheetah Run facility was being built. This area included indoor runs and bedrooms as well as six large outdoor yards.

There are nine full-time trainers and one working supervisor responsible for the Cheetah Run training program and area. The animal training team is a dynamic group of individuals with a variety of experience levels and knowledge. The professional experiences of each individual range from large carnivores and marine mammals to education ambassador animals; however, no individual had prior experience with cheetahs. The animal training team and animal collection were both complete in March 2011.

Cheetah Run officially opened to the public in May 2011. The facility is comprised of one exhibit habitat, three behind the scenes outdoor habitats, seven indoor bedrooms, and one outdoor bedroom totaling 12,000 square feet. It is equipped with outdoor and indoor space utilized for free-contact sessions outside of the normal animal enclosures. The facility was designed to provide the ability to work with the cheetahs in both protected- and free- contact environments. All of the en-

closures are connected by a series of chutes and guillotine gates (Figures 1 and 2).

The Cheetah Run Training Program

The vision of Cheetah Run is to be a state of the art cheetah training, education, and conservation facility. In order to achieve our mission, a behavioral conditioning program using operant conditioning paired with the exclusive use of positive reinforcement was established. A behaviorally minded culture within the area was cultivated from the very beginning by defining the training philosophy and goals. The program was developed by first establishing a structured framework that incorporated the experience and knowledge from the cheetah training team as well as from successful positive reinforcement training programs already in place with other taxa (i.e. cetaceans, pinnipeds, psitticines, canines, and elephants) at our sister parks. Fundamental learning theory and philosophy were tailored for application with cheetahs and for application in the Cheetah Run facility. A variety of food items such as balled ground meat, chunks of meat, whole prey, and bones are used variably as primary reinforcement. Food items are delivered through hand, spoon, and tong feeding in both protected and free contact scenarios; although, hand feeding is used most commonly. Variable Ratio of reinforcement along with Reinforcement Variety (V.R.R.V) was used for the long term maintenance of behavior.

Various session types were defined as follows:

Exercise – high energy behaviors, such as runs.

Learns – learning something new.

Relationship- increases reinforcement history between animal and trainer.

Enrichment- involves Environmental Enrichment Devices in or out of stimulus control.

Husbandry – learning or practice of medical behaviors.

Show – daily public presentations and or tours.

Free Feed- delivering reinforcement without presenting any discriminative stimuli (S^{D}'s). (Often happens with a relationship session).

Gate- animals to move from one location to another hold while other animals move in and out of the current location, and or hold while a gate moves.

In order to effectively and proactively minimize frustration and frustration-induced aggression, application of the Least Reinforcing Scenario (LRS) was incorporated into the program. A whistle was conditioned as a terminal bridging stimulus. The terminal whistle bridge was conditioned by training several terminal behaviors so that there was an observable response to the whistle. These initial behaviors were lie down, stay, stand, and distal platform. Lastly and most importantly the use of aversive stimuli such as cheetah poles was completely and immediately eliminated for use in the program regardless of their previous learning history.

Cheetah Groups and Histories

Group A :

Comprised of 0.7 hand reared individuals. This group was acquired in January of 2011. This group arrived at the park at approximately 7 months of age. These cheetahs had a predominantly positive history with people. None of these animals had never been conditioned to or experienced a cheetah pole.

Group B:

Comprised of 1.0 neonate cheetah that the Cheetah Run team was hand rearing and 0.1 domestic dog that was acquired from a local shelter. Acquired in February of 2011.

Group C:

Comprised of 2.1 parent reared littermates. Acquired in the Fall of 2010. This group arrived with minimal prior training. They would frequently exhibit avoidance behaviors in relation to trainers since they were conditioned to avoid people and cheetah poles prior to coming to Busch Gardens. This group did not readily approach trainers for sessions. They exhibited aggressive behaviors such as hissing and swatting as well as avoidance behaviors towards trainers. Additionally, this group had minimal exposure to many environmental stimuli that were common in the Cheetah Run facility. These stimuli included overhead roofs, lights, and gates.

We determined that these groups were not compatible with one another and would be managed separately.

Early Conditioning

The initial stages of training began at the onsite holding facility approximately 2 months before the grand opening of Cheetah Run. During this stage we focused on establishing positive and trusting relationships with all of the animals. Due to their divergent histories with people, each group exhibited different behavior and comfort levels in relation to trainers. We slowly began to build positive relationships with the animals based on the observed baseline behavior of each individual and group. Relationship sessions took place in both free- and protected- contact with Group A and Group B and in protected contact with Group C. Relationship sessions involved free-feeding the animals, taction from trainers, and trainers spending time near the animals. The animals were always given the choice to approach or move away from the trainers. As the animals began to exhibit an increased level of comfort with the trainers, a verbal bridge (good) was conditioned by repetitively pairing it with primary reinforcement (i.e. food). At this point all of the animals were conditioned to come to their name, to sit, to lie down, and to move from point A to point B (A to B's).

All of the animals quickly became fluent with these fundamental behaviors. Positive and trusting relationship-building sessions continued to be the priority of Group C. In addition, we began to condition the foundation of several more advanced behaviors with Groups A and B. This training included a crating behavior, catching a lure, wearing a harness and collar, and leash walking.

Desensitization was initiated with all of the groups before moving to the Cheetah Run facility. All of the animals were systematically desensitized to a variety of environmental stimuli such as the Cheetah Hunt coaster, large crowds, children, umbrellas, strollers, ambient music, and even nightly fireworks. We did this by setting up speakers that played loud coaster and firework sounds as well as hang high flying flags and kites around the behind the scenes facility to simulate movement overhead The level of the sound was gradually increased over several days while the animals were differentially reinforced for targeted calm behavior such as lying down. During this

time we were also able to work with our education department, and develop a behind the scenes, Endangered Species tour. This opportunity gave the guest a chance to learn about the plight of the cheetah, as well as provided us with an opportunity to desensitize the animals to groups of people.

The next step was to begin desensitization to the Cheetah Run facility. After the habitat was deemed animal-safe, Group A and Group B were introduced to the new facility approximately one week prior to the grand opening. The cheetahs were individually asked to crate and then were loaded into a vehicle and transported to the new facility. The animals were then walked on leash and harness throughout the habitat while reinforcement was delivered. The cheetahs were proactively asked to enter and exit their crate under stimulus control while on the habitat. In addition, the cheetahs always had access to an opened crate and could choose to go into the crate at any time. The sound of the coaster was already successfully desensitized but, the visual stimulus of the coaster and ambient music was still novel. Due to the previous training for leash walking, crating, and coaster desensitization, the animals were quickly desensitized to all of these new stimuli.

Moving to Cheetah Run and Grand Opening

Group A and Group B were moved to the Cheetah Run facility approximately 2 days before the grand opening. Group C was moved to the facility several months later. All of the animals generalized their previous learning at the holding facility to the new Cheetah Run facility almost immediately. The focus of training and goals was again tailored to each group. Shifting and separating was quickly placed as the top priority for all of the animals due to the high frequency of daily demonstrations. This "show" schedule created the need for all animals to quickly shift and separate to a variety of enclosures and in various social combinations numerous times throughout each day.

Group A & B

These animals immediately began participating in all of the daily Cheetah Run public programming by generalizing their initial training that had begun prior to moving to Cheetah Run. Shifting quickly became a priority for these groups as well due to the necessity of frequent and variable shifts and separations. As with Group B, all separations and shifts were only asked for under stimulus control. After a short time, large reinforcement items such as bones were only given to solo cheetahs in an effort to maintain long term compatibility within Group A. This prevented the rehearsal of aggression and displacement amongst individuals. Positive social dynamics were reinforced by training multiple animals to station and earn reinforcement next to each other without displacement behavior.

Group C

The training focus and goals set for this group was to continue building positive relationships with all trainers, to extinguish all avoidance and aggressive behaviors towards people, and to readily shift on and off exhibit at any time. Their primary role was to occupy the exhibit while other animals were in training sessions. Reliably shifting proved to be the largest challenge for this group. They would exhibit avoidance behaviors when asked to come to control in front of trainers and when S^{D}'s were presented. This aversion was most likely due to their prior avoidance based learning with cheetah poles. In the beginning this group would frequently refuse to shift and or break control while in the chute system. They would often show aversion to a variety of environ-

mental stimuli in their new environment. Due to their unreliable shifting behavior, scheduled public programming would often be altered or cancelled. In order to develop trust with trainers and to decrease the time that the animals would stay in the chutes, all separations and shifts occurred only under stimulus control. Gates were never opened or closed without all of the animals under behavioral control with trainers. This reduced stress by giving the animals choices during gate movement and provided trainers with opportunities to reinforce correct shifting behavior. The frequency of shifts, locations, time of day, and amount of time spent in any area was consistently unpredictable. Relationship and learning sessions were also frequent. Properly utilizing and reinforcing the LRS regularly occurred. If the animals exhibited aversion to trainers or other stimuli by hissing, swatting, and or splitting, reinforcement would be delivered each time that the animal came back to control with the trainer and maintained a relaxed yet attentive body posture. The frequency that the LRS was reinforced gradually decreased as the animals' comfort level with trainers increased. The shifting behavior became increasingly more reliable over time. The animals also began to interact with their environment and trainers with relaxed body postures, and even began to solicit interaction from trainers outside of sessions. This group became completely reliable when asked to shift and were regularly exhibited on the habitat.

Current Cheetah Run Program

The current Cheetah Run program consists of a variety of sessions and presentations throughout each day. Cheetahs have been relocated to other facilities due to Busch Garden's participation in the cheetah Species Survival Plan. The present collection at Cheetah Run is 1.4 cheetahs that range in age from 3 years old to 4 years old. The current repertoire and programming is a direct result of the fundamental training that occurred prior to the grand opening of Cheetah Run and of the relationships that have been built between the cheetahs and trainers. Our training program was designed to include a variety of regular presentations that would connect guests to cheetahs in ways that would not be possible otherwise. The behavior repertoire allows guests to get close to cheetahs through leash walking sessions, to experience the speed of the cheetah first hand through lure runs, outreach programming, and uses the relationships between the cheetahs and trainers to further inspire our guests to participate in conservation.

Protected Contact Sessions

Blood Draws, Hip Injections, and Ultrasounds– All of the cheetahs in the collection have been successfully trained for voluntary blood draws in protected contact. The animals have been conditioned to lie down in a chute while positioning their tail on the floor outside of the chute. They maintain this position while the back door of the chute is lowered over their tail. The door is closed to allow protected contact access to the animal's tail. It is not closed to hold the cheetah's tail or restrain the animal in any way. The front or head door remains opened and provides the animal with the opportunity to leave the session at any time. In addition, the cheetah has access to their indoor enclosure throughout the session. The animal remains in this position with its tail flat on the floor. The animals have learned to reposition their body and tail forward and backward when asked. This body positioning behavior allows the animal to voluntarily position its body to meet the specific needs of each session. The cheetah's tail vein is held off by hand while the blood is drawn. This is done using two people. Once the blood has been drawn and that staff has exited, the tail door is raised and the animal is reinforced. Lastly, the cheetah is shifted back into the cheetah building by being pointed from the blood trainer to an inside trainer. The cheetahs have also

been desensitized to hip injections and ultrasounds using the same chute, behavior, and process.

Scales and Weights- The animals follows the trainer to a scale and then stands on the scale with all four feet while the trainer reads the weight.

Separations, Shifts, and Socials- Shifting and separations always occur under stimulus control. The animal(s) are pointed from point A trainer to point B trainer or they remain at control while other animals leave or enter the group. The cheetahs have also been conditioned to work side by side with one another and with a single trainer. The animals are reinforced for allowing a conspecific to eat by exhibiting calm and non-aggressive body postures throughout the session. This training has proven to be crucial for maintaining reliable gating and separations that is carried out up to 12 times each day. In addition it has been crucial for maintaining the compatibility of female cheetahs into maturity.

Other Behaviors- lie down, stay, vertical stand, open mouth, target, distal platform, back up, and crate behaviors have all been conditioned with all of the animals through operant conditioning using positive reinforcement and successive approximations. The backup behavior has been conditioned through free shaping, differential reinforcement, and the terminal whistle bridging stimulus.

Free Contact Sessions

Hip injections, nail trims – Desensitization to taction from trainers began prior to moving to Cheetah Run facility. Trainers frequently spent time with the animals in free contact sessions. Primary reinforcement was used for training the animals to accept taction and manipulation. The animals are held under stimulus control with a protected contact trainer. The animal is asked to sit while a free contact trainer injects the animal in the hip for vaccinations. This same process and behavior is used for nail trims and for treating wounds, eye drops.

Leash Walks- The cheetah stations with a protected contact control trainer while a free contact trainer puts the standard nylon collar and K9 cop harness on the animal. The free contact trainer then attaches a leash to the harness S^D while a ^{s}econd trainer attaches a leash to the collar. The cheetah heels on the left side of the primary trainer throughout the duration of the session. The cheetahs can be asked to sit, crate, and jump up on platforms throughout the walk. Leash walking sessions occur throughout the cheetah run facility. The cheetahs can also be walked to the surrounding public areas, classrooms, and occasional outreach programs. Desensitization to this equipment and novel environments began at a young age.

Lure Run- The cheetahs were conditioned to chase and catch a lure at the behind the scenes facility in preparation for daily lure run presentations that would begin at the grand opening of Cheetah Run. Bird feathers were chosen as the lure and were paired with large amounts of primary reinforcement. Lure running demonstrations occur each day. In order to maintain fast and exciting lure runs, the sessions are planned with complete variability. Variability is achieved through

changing course patterns, duration, frequency, and time of day. Although, all of the cheetahs regularly participate in lure runs, individual cheetahs participate variably throughout the week. After a countdown from the guests, a gate is opened giving the cheetah access to the lure. The cheetah is reinforced for their fastest speed by allowing them to catch the lure while they are running at their fastest. The cheetahs have been conditioned to chase the lure in multiple directions and to continue to run repetitive laps. The number of laps range from approximately two to five laps without stopping. The cheetah is given time to interact with the lure upon catching it. Adhering to a variable schedule of reinforcement, the cheetah does not always catch the lure in every run. A free contact trainer then approaches the cheetah and calls the animal to control to deliver primary reinforcement. Finally the cheetah is sent to a protected contact trainer and is shifted into a neighboring enclosure. In order to effectively deliver primary reinforcement for catching the lure and to not create competition between individuals, only one cat participates in each lure run.

Free Contact Relationships, Learns, and Practices – The trainers routinely work with the cheetahs in free contact environments each day. These sessions provide the opportunity to continue to build relationships with the cheetahs through training new behaviors and practicing learned behaviors all while delivering reinforcement. These sessions are also used as demonstrations for the daily public presentations.

Crate- The animals were conditioned to enter their crates by delivering the majority of their base diets in the crates. This is a basic behavior that is rehearsed and reinforced regularly in order to maintain a high value of reinforcement that can be utilized in emergency scenarios on- and off-site. The animal is pointed into the crate by a free contact trainer. The animal calmly stays in the crate while the trainer closes the crate door. Finally, the door is opened and the animal is pointed back to a protected contact control trainer. Crate training (both protected and free contact) has allowed us to transport and relocate cheetahs without ever using chemical or physical immobilization and without ever forcing the cheetahs into the crates.

Recall- The animal's name is used as a recall during free contact sessions. This behavior is simply a shift of control from one trainer to another and is intended to be used at any time and at any location. The recall most often occurs at the protected contact spotter position; however, it can also occur between two free contact trainers. The animals are conditioned to stop what they are doing and go to the location that recall was sounded. This is a behavior that is also utilized as a safety precaution during any emergency scenario. Additionally, a metal bell has been conditioned as an S^D to immediately and quickly shift off of the habitat. This response is intended to be utilized in the unlikely event that a foreign object enters the habitat that could hinder the safety of the cheetahs, guests, or trainers.

Additional Programming- In addition to the normal presentations, the cheetah collection has successfully participated in a variety of extra programming. Two of the cheetahs participated in lure runs at Tropicana Field, the home of Major League Baseball's Tampa Bay Rays. These runs were filmed and made into a SeaWorld Parks and Entertainment produced DVD series entitled Saving a Species - Cheetah. We worked with *Nat Geo Wild* to film the cheetahs running next to two NFL players for *Big Cat Week's Man vs. Cheetah*. For the safety of the football players and cheetahs, a

large wall was installed on the habitat. Due to the positive relationships between the trainers and cheetahs as well as the long history of environmental desensitization through systematic desensitization using positive reinforcement, the cheetahs were quickly desensitized to the novel stimuli in each of these scenarios. The cheetah and domestic dog pair were also featured in programming for BBC and National Geographic. In addition to media, the cheetahs participate in education outreach events at a variety of venues including classrooms and other zoological facilities.

Discussion

The cheetah training program began by implementing fundamental animal training philosophies and techniques. Utilizing only positive reinforcement to modify and manage behavior has allowed trusting and positive relationships to be built between all of the cheetahs and trainers regardless of the cheetahs' previous learning histories. The collection has been successfully desensitized to the Cheetah Run facility through counter conditioning with positive reinforcement and by always providing with cheetahs with choices throughout the process. This dynamic cheetah exhibit quickly became a guest favorite due to the cheetahs actively interacting with their environment each day. This activity level is due to the reinforcement history that had been established through the desensitization process. Positive reinforcement created and fostered an environment that allowed a nontraditional and diverse collection of cheetahs to become proficient in a behavior repertoire that was crucial in achieving the area's goals. The cheetahs routinely participate in programming that has allowed us to inspire our guests through lure runs, interactions with trainers, and leash walks. Additionally, positive reinforcement training has benefited our husbandry program. Medical care has routinely been accomplished through using the conditioned husbandry behavior repertoire for each of the cheetahs. These husbandry behaviors include blood draws, ultra sounds, and injections. The Cheetah Run training culture and program has enabled us to develop a safe and enriching environment for the animals, trainers, and guests. We have successfully and safely interacted with the cheetahs in thousands of free contact training sessions since the inception of the program. The current behavior repertoire is intended to continually progress in order to allow future goals to be met. A long term objective is to successfully breed the ambassador collection of cheetahs. Successfully managing and conditioning the cheetah collection to serve in ambassador and breeding roles will increase the genetic diversity and breeding success of the entire cheetah population. Additionally, the cheetah training team will continue to advance the public programming that is offered by increasing the amount of lure run demonstrations and leash walks both in and out of the park.

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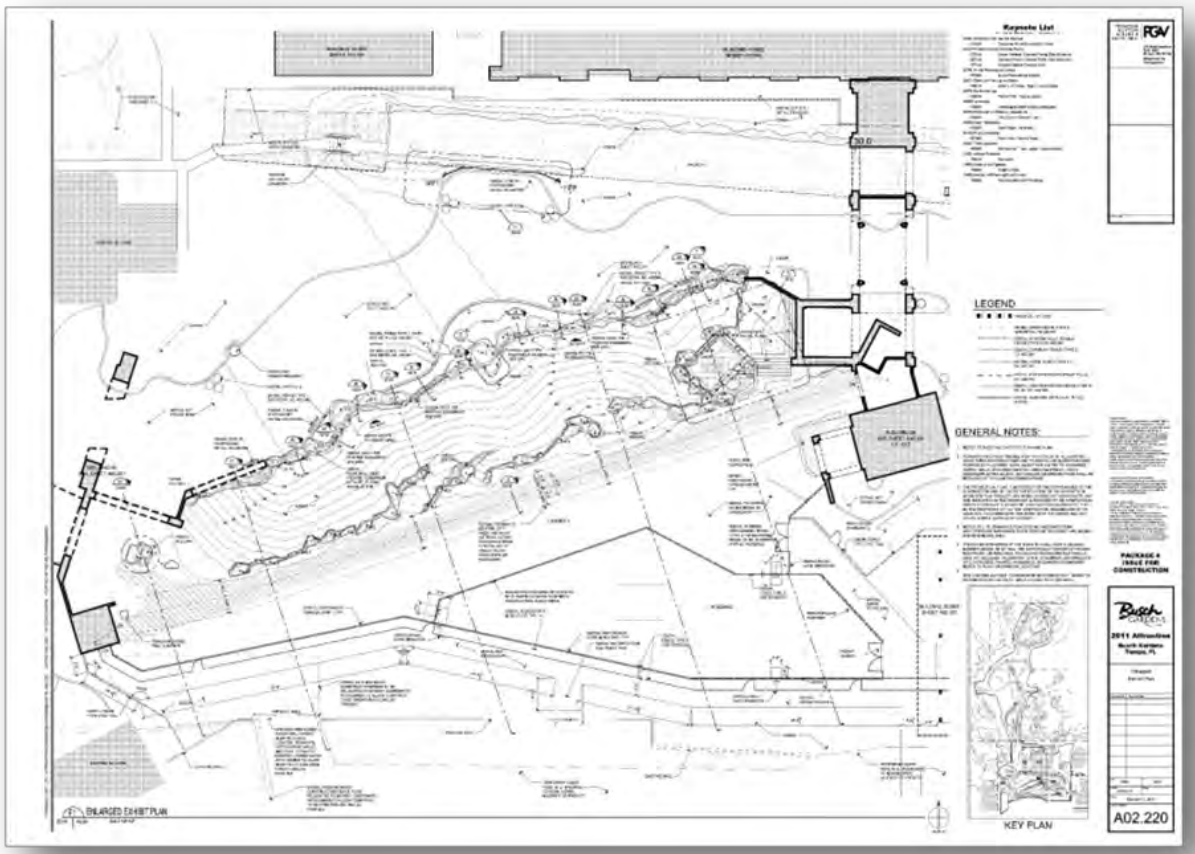


Figure 1.Schematic of Cheetah Run.

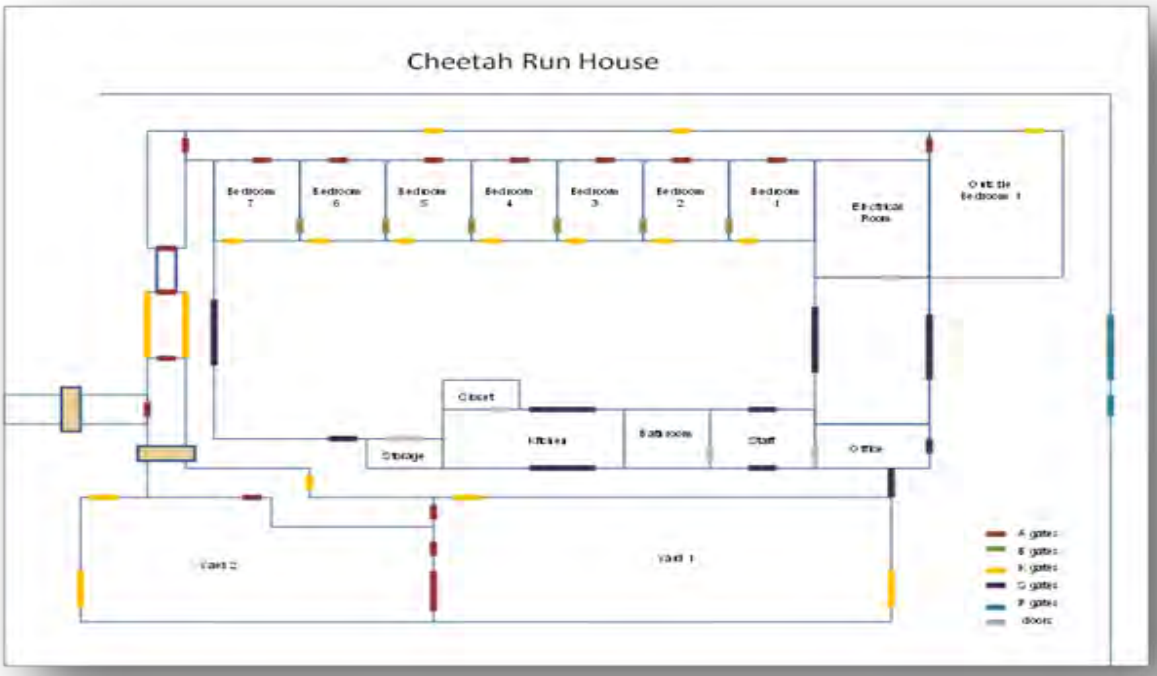


Figure 2.Map of the indoor Cheetah Run facility.

Presentations

Replacing Repetitive Behaviors with Natural Behaviors of North American River Otters Using Goal-Based Enrichment

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Behaviors not seen in natural environments, such as repetitive behaviors, can be a difficult thing to explain to guests and manage within the animal collection. At the Downtown Aquarium in Denver, we identified patterns in the repetitive behaviors of our 3.0 North American river otters and developed a plan to modify those behaviors. Our goal was to create a solution to redirect the unproductive behaviors to productive ones exhibited by their wild counterparts. For one year, we closely observed and documented the repetitive behaviors without changing the group's daily routine. We discovered the repetitive behaviors were most prevalent after feeding time, suggesting an increase in energy after consuming a meal. In the following year, we focused on using goal-specific enrichment to decrease the repetitive behaviors and increase productive behaviors such as grooming, foraging and social interaction within the group. After eight months of applying these modifications, we have seen some decrease in the repetitive behaviors in two otters. This suggests that, by identifying and analyzing undesired behaviors, they can be minimized by creating goal-based, productive behavioral enrichment.

The Downtown Aquarium in Denver displays 3.0 North American river otters (*Lontra canadensis).* These otters all exhibit repetitive swim patterns of varying degrees. The older two otters have been exhibiting these behaviors for over seven years. The younger otter has been exhibiting these behaviors increasingly over the last year. Small temporary changes have been made to the exhibit in the past, but otherwise nothing has been tried to alter the repetitive behavior. For the purpose of this study the definition of repetitive behavior is: any behavior on land or water that is repeated two or more times in a row.

Methods

River otters can travel up to 24% more per day during breeding season (Reed-Smith, 2012). The hypothesis for the first year of this repetitive behavior study was: the repetitive behaviors will increase during the otters' breeding season. To determine breeding season, two methods were used. The first was to record the number of latrine spots with fecal markers. This was based on breeding facilities noting an increase in latrine sites when males were in breeding season. Food coloring was injected into one fish at the beginning of the day, once a week for the older males, Blue and Slater. Latrine sites were then counted throughout the day. Additionally, testicle measurements were made weekly of the older males. They were trained to present their ventral side toward the fence and pictures were taken on their testicles. Since males have increased testosterone and volume of sperm during their breeding season, this is a good indication of when they may experience breeding behavior (Reed-Smith, 2012).

River otters have different breeding seasons among a species depending on their latitude of birth. Northern born river otters should exhibit breeding season from March-June and southern otters from November-February (Reed-Smith, 2012). These otters are housed in an indoor facility which features skylights. Breeding season for Slater is abnormal and lighting modifications are being considered to alter his seasonality. Slater's (southern otter) breeding season was determined as August-October. Breeding season for Blue (southern otter) was determined to be December-April. Not enough data had been collected on Emmet (northern otter) due to his age.

To record the repetitive behavior, 16 observations of 10 minutes each were made each week for one year. The observations were from 8 A.M. to 3:30 P.M. at half-hour increments. Each time increment had one observation per week. Feeding times were used as the control. The otters were fed every day at 8:30 A.M., 11:30 A.M., 1:30 P.M., and after 4:00 P.M. The number of seconds spent doing repetitive behaviors during the 10 minute observations were recorded.

The repetitive behaviors being recorded varies between otters. Blue exhibits continual backflips in the water at all three of the public viewing windows. Slater exhibits circle patterns including backflips from the front to the back of both pools. During the first year Emmet exhibited very few repetitive behaviors, however, when he does exhibit repetitive behaviors he swims large circles along the viewing windows.

Results - Year One

Both Blue and Slater's repetitive behaviors were higher than average during their breeding seasons (Table 1, 2). Additionally, Emmet showed higher than average repetitive behavior during both Blue's and Slater's respective breeding seasons (Table 3). Keepers also had to separate Emmet and Slater for two weeks in September 2012 due to a high level of breeding aggression from Slater toward Emmet. Also, all three otters showed significantly higher amounts of repetitive behavior immediately following eating (Table 4).

The conclusions from year one is that breeding season does play a part in increased repetitive behavior. This could be due the biological need for these otters to travel to find a mate. Also, breeding season may play a part in the social-dynamics between conspecifics. Feeding time does increase repetitive behaviors, possibly due to the rapid increase in energy from the food or the lack of foraging energy being spent to acquire the food.

Methods – Year Two

When considering how to reduce the repetitive behaviors, several options were considered. Changing the feeding amounts or times was an option. However, it was decided that this would just change the times the behaviors were happening rather than alter or decrease the behavior. The goal was to change the frequency of the repetitive behaviors by modifying the exhibit or the enrichment schedule. The hypothesis for year two was: using goal-specific enrichment will decrease the repetitive behavior. Social interaction was important for the staff to attempt to eliminate the social aggression seen by Slater in September of the first year.

Observation times remained the same. The times were broken into observation sets where various enrichments would be given at the beginning of each observation set. Enrichment was chosen based on previously completed ratings for efficacy and goal setting. Chosen enrichments were not given in the month prior to attempt to make each item neutral in novelty. Occasionally, chosen enrichment was given early inadvertently. These enrichments were moved to a later observation by at least one week. Each time set had different goal based enrichment as follows:

8:00 A.M. – 8:30 A.M. – no enrichment given, control
9:00 A.M. – 11:30 A.M. – item thrown over top of exhibit, examples: produce, Nalgene bottles, ice
12:00 P.M. – 1:30 P.M. – live food, puzzle feeders, foraging activities
2:00-3:30 P.M. - substrates

The 9:00 A.M. enrichment was given right before the observation started. This was the highest time period for repetitive behavior during year one. The 11:30 A.M. enrichment was chosen to be guest focused enrichments, items that would keep the otters' active during the peak

guest times. The 1:30 P.M. enrichment was chosen to encourage social bonding and grooming.

Results – Year Two

Year two is ongoing until June 1, 2014, so these findings are still preliminary. Blue shows a decrease in repetitive behavior by 33%. However, the control time set also decreased by 50% (Table 5, 6). Slater shows a decrease of repetitive behaviors by 15% with a 46% increase in the control time set (Table 7). During Slater's breeding season, his repetitive behaviors decreased by 86% (Table 8). Emmet shows an increase in repetitive behavior of 56% and an increase in the control of 42% (Table 9).

Blue's *p*-values calculated by Student's t-test are 0.03, 0.003, 0.1, and 0.30 for each time category respectively for time spent doing stereotypical behavior during year one and year two with enrichment. Slater's *p*-values = 0.13, 0.09, 0.45, 0.24 for each time category respectively. Emmet's *p*-values = 0.44, 0.23, 0.07, 0.06 for each time category respectively. *P*-values less than or equal to 0.05 shows there is statistically significant difference between stereotypical behavior during year 1 and year 2 with enrichment.

Each enrichment item is being evaluated for its efficacy to reduce the repetitive behaviors among each individual. Samples sizes among each type of enrichment are unequal until the year is completed. Enrichment's with low sample sizes are still included but efficacy is not concluded on until sample size is equal to the others.

For Blue, produce (n=8), live food (n=10), natural substrate (n=4), and small ice blocks (n=6) show to be most effective in reducing repetitive behavior (Table 10). For Slater, large ice blocks (n=4), live food (n=10), novel food (n=7), and small ice blocks (n=6) are most effective (Table 11). For Emmet, large ice blocks (n=4), puzzle feeders with live food (n=4), unnatural substrate (n=9), and novel visual (n=3) are most effective (Table 12). Least effective items for Blue are novel visual, puzzles without food, unnatural substrate and novel puzzles with live food. Least effective for Slater are unnatural substrate, novel visual, ice in toys and novel toys. Least effective for Emmet are novel substrates, novel toys, puzzles without food and natural substrates.

Conclusions for Blue are that enrichment may be effective for reducing repetitive behavior, however there may be other factors such as age and mobility at play. During the last year Blue's dosage of glucosamine was increased, so arthritis pain may be a factor in the reduced activity level. The increase in repetitive behavior with the addition of several different kinds of novel enrichments is something to consider. Anecdotal notes made during the novel enrichment observations were that Blue spent little time investigating the item before starting the repetitive behavior.

Slater shows that enrichment can be useful to reduce his repetitive behaviors and alter the behavior to productive behaviors associated with the enrichment. Foraging for free food, not in puzzles, seems to be the most effective enrichment here.

Emmet shows an overall increase in repetitive behaviors. Several factors may be contributing to this. Emmet is now reaching sexual prime and the desire to search for a mate may be stronger. He shows an increase of 161% in repetitive behaviors from October-February in year two as compared to year one. This could be suggesting Emmet is beginning to have a hormonal breeding cycle. More thorough breeding season monitoring has begun as of March 23, 2014 to determine his breeding season. He shows a 61% increase in repetitive behavior from year one to two during Blue's breeding season and a 7% decrease during Slater's breeding season. This may conclude that Slater's breeding season doesn't coincide with an increase in repetitive behavior from Emmet but perhaps Blue's does.

Methods – Year Three

Both Blue and Emmet still show unique challenges to decreasing the repetitive behaviors.

Year three will involve modifying the approach to Blue's and Emmet's reductions, while building on the goal-based enrichment for Slater. Each otter will be receiving the most effective individual enrichment based on the seasons in which they demonstrate higher activity. For example, when Slater approaches breeding season, enrichment will be given based on the most effective evaluated enrichments for reducing repetitive behavior for him.

In addition, breeding season modifications via light cycles will be recommended. Monitoring testicle size and latrine sites will be critical during year three for all three otters, especially Emmet. Novel items were least effective for Blue and possibly promoted the repetitive behavior, studying this will be important. Giving the same novel items several times in a row with different presentations may show to increase comfort level and familiarity with these items thus decreasing repetitive behavior.

Conclusion

In conclusion, breeding season, feeding times, and age play a part in the activity level of river otters. Understanding the cause of the repetitive behaviors is important for potentially reducing those behaviors, in part so that guests will observe the otters' exhibiting natural behaviors such as grooming and foraging. Also, even though this group of otters is not actively breeding, it is important for husbandry purposes to monitor the breeding conditions of these animals. An unnatural breeding season may be a result of the exhibit, or possibly even age. Being knowledgeable about what enrichment is effective for each individual otter can promote natural behaviors and decrease repetitive behaviors. Having a goal-based enrichment program – in which enrichment is always being evaluated for efficacy – is an important husbandry tool. In addition, treating each animal's individual enrichment preference, rather than providing enrichment to the group as a whole, is a helpful tool when selecting daily goal-based enrichment.

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Enrichment for the Real World

Stephanie DeYoung, BSc, MA
Pawsitive Pet Training & Services, LLC

The zoo world has done a wonderful job of implementing daily environmental enrichment activities into the care and husbandry of its animals. While more pet supply stores are carrying enrichment items made for companion animals, a vast majority of the general public does not understand how these items can benefit their pets or understand how to properly use these items.

As a dog trainer in the private sector, I have shared many of the strategies used throughout the zoo community with my clients. Explaining to clients how to create simple enrichment schedules, varied enrichment types, and even showing how many items can be homemade can all combine to modify behaviors for the animals in people's homes.

Sharing some of the ways I've utilized many tools used primarily by zoos for animal training and enrichment with my own dog training clients, I hope to show other ABMA members how they can make their knowledge and skills understandable to the general public and encourage private individuals to try these strategies at home with their own pets.

Animal behavior professionals will agree that Environmental Enrichment can play an important role in any animal's life. The benefits of enrichment have been proven in scientific research for a variety of animal species, both domesticated and exotic. In 2002, The Association of Zoos and Aquariums (AZA) began requiring a formal enrichment program as one of the accreditation standards (www.AZA.com [AC-31]). While various pet care manufacturers have started marketing items for companion animals, a large majority of pet owners are still unsure of how to properly use these items or even what benefits can be achieved from these products.

As a professional dog trainer with an employment history as well as educational background in the zoo industry, I have made it a point to educate all of my clients about how to best utilize pre-made and even homemade enrichment items with their dogs. Large pet care stores such as PetSmart and even drug stores such as Walgreens and CVS Pharmacy have started carrying products such as puzzle feeders and other interactive dog toys. The main problem is that most members of the public fail to understand the value of such items or even how to most effectively incorporate these items into the management of their pets.

Sharing tools used in the zoo industry for several years has enabled my clients to see the benefits first-hand that enrichment can have on their dog's lives. Enrichment schedules (Appendix A), rotating enrichment items, and even introducing clients to the different types of enrichment are all tools that can easily be adapted to the domestic animal world.

The key to success for "non-animal industry folks" is to KEEP IT SIMPLE. Showing people how enrichment doesn't have to be expensive or time consuming is another important aspect to success of Enrichment in the Real World!!

While there are numerous new enrichment products becoming available to the general public, one of my favorites to recommend to clients is the Classic KONG toy. This item is readily available and easy for novice enrichment providers to understand. Simply putting some peanut butter into the KONG and freezing it before giving it to the dog has been proven to relieve stress as well as boredom (DeGesero, 2010). The KONG website (www.kongcompany.com) has several

easy recipes for stuffing ideas.

Showing people the different types of enrichment they can provide their pets is another important aspect of successful enrichment implementation at home. Simple enrichment activities during feeding times are a quick way for a client to see how much fun and beneficial enrichment can be for their pets. A muffin pan with tennis balls covering food can be a simple puzzle feeder people can easily create for their dogs. The food is simply placed in the muffin cups then covered with tennis balls to encourage the dog to "forage" for their food. I recommend people begin with some of the food exposed so the dog can quickly understand that object of the game. Olfactory enrichment, puzzle feeder enrichment, cognitive enrichment such as teaching new tricks or even the "101 Things to Do with a Box" game (http://www.clickertraining.com/node/167) can all be beneficial and simple forms of enrichment anyone can do.

The most beneficial aspect of enrichment for companion animal pets is that their owners see how so many unwanted behaviors (especially in dogs) can be eliminated by just developing a simple enrichment program in their own homes.

Many of my clients quickly begin to develop their own versions of enrichment. However, for those people who have a difficult time creating new items, I refer them to www.pinterest.com. I recommend they search "dog enrichment ideas" or even "homemade dog enrichment".

Additionally, the book Beyond Squeaky Toys: Innovative Ideas for Eliminating Problem Behaviors and Enriching the Lives of Dogs and Cats by *Nicole Nicassia-Hiskey & Cinthia Alia Mitchell* is also an excellent resource for enrichment ideas for the general public.

Giving people a simple list of various enrichment ideas can encourage people to try some of the ideas and see first-hand the benefits of enrichment (Appendix B).

While positive reinforcement based basic obedience training, behavior modification, and proper animal management all play important roles in a peaceful and happy companion animal household, utilizing tools from zoo industry enrichment programs can make it easy for the general public (in this case specifically dog owners) to incorporate enrichment into the lives of their pets.

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Appendix A

PAWSITIVE PET TRAINING & SERVICES, LLC
Dog Walking • Training • Pet Sitting

Garner Family Ivy Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Everyone work together on Poop Patrol Make enrichment items for week	Andy poop patrol Andy Pick enrichment item for Ivy for Tuesday	JoJo poop patrol JoJo Pick enrichment item for Ivy for Wednesday	Andy poop patrol Andy Pick enrichment item for Ivy for Thursday	JoJo poop patrol JoJo Pick enrichment item for Ivy for Friday		Celebrate 1st week of everyone working together to help Ivy
Everyone work together on Poop Patrol Make enrichment items for week	JoJo poop patrol JoJo Pick enrichment item for Ivy for Tuesday	Andy poop patrol Andy Pick enrichment item for Ivy for Wednesday	JoJo poop patrol JoJo Pick enrichment item for Ivy for Thursday	Andy poop patrol Andy Pick enrichment item for Ivy for Friday		Celebrate 2nd week of everyone working together to help Ivy
Everyone work together on Poop Patrol Make enrichment items for week	Andy poop patrol Andy Pick enrichment item for Ivy for Tuesday	JoJo poop patrol JoJo Pick enrichment item for Ivy for Wednesday	Andy poop patrol Andy Pick enrichment item for Ivy for Thursday	JoJo poop patrol JoJo Pick enrichment item for Ivy for Friday		Celebrate 3rd week of everyone working together to help Ivy
Everyone work together on Poop Patrol Make enrichment items for week	JoJo poop patrol JoJo Pick enrichment item for Ivy for Tuesday	Andy poop patrol Andy Pick enrichment item for Ivy for Wednesday	JoJo poop patrol JoJo Pick enrichment item for Ivy for Thursday	Andy poop patrol Andy Pick enrichment item for Ivy for Friday		Celebrate 4th week of everyone working together to help Ivy

Appendix B

PAWSITIVE PET TRAINING & SERVICES, LLC
Dog Walking • Training • Pet Sitting

Fun & Easy Outdoor Activities for Dogs

1. **Kiddie Pool**- you don't have to just put water in the pool. Sandbox sand can be put in a kiddie pool and toys can be hidden on the sand to satisfy the natural desire dogs have to dig in sand. Of course, water can also be put in the pool. There are a lot of floating dog toys that can be put in the water to encourage dogs to play in the water. (Note: Not all breeds of dogs enjoy swimming)

2. **Pup-Sickles**- liquids such as chicken broth, beef broth, plain yogurt, and even applesauce can all be frozen to give dogs a great "outside only" treat. You can put the liquids in a regular ice cube tray or even freeze the items in layers and then the dog can enjoy a layered frozen treat.

3. **Sprinklers –** some dogs love playing in the sprinkler

4. **Home-made dog treats**- There are a ton of home-made dog treats available online. My dogs' favorite ingredients include peanut-butter, pumpkin, carrot, and apples. Then again, my crew of dogs is not picky about their treats!!

5. **Frozen Kong Treats**- Peanut butter is a popular favorite filler for the Kong but the company's website www.kongcompany.com has a ton of Kong filler options

6. **Bubbles –** inexpensive bubble machines available at various department stores can give dogs a fun activity. Some stores even offer flavored bubbles made specifically for dogs.

7. **Olfactory Enrichment (Scent enrichment)** - Sprinkle different spices or perfumes around the yard. This olfactory enrichment can give dogs novel odors in their yard. The water from cooked hotdogs, chicken, or other meats can be poured in a trail through the yard. If you know someone with horses or other livestock, simply scatter some hay, pine shavings, or even hair around the yard for your dogs to smell.

Preventing Pug-Nacious Behavior

Rickey Kinley
Gary's Professional Dog Grooming and Training

Pugs are a naturally non-threatening, comical, and fun breed of dog. This paper will describe how pugs were used to teach positive reinforcement training techniques to help people in the workplace to better understand how to use positive reinforcement to improve working relationships. This three part team building session involved first an interactive presentation explaining positive reinforcement animal training techniques and human behavior. Secondly, a short hands-on workshop involving playing the "training game" with colleagues and thirdly, a chance to practice basic animal training techniques with the pugs from a local pug rescue organization. The results were that attendees learned new ways to interact with co-workers, friends, and family in more positive ways.

A Study of One: Using Education Birds for Breeding (One Is the Loneliest Number…)

Cathy Schlott
National Aviary

Many institutions have one bird of each species in their education collection to be used for programming or shows. These birds are valuable assets for teaching, but having single birds may not be the most effective and efficient method. Keeping two of the same species can potentially provide a number of benefits for the institution: allowing for a "backup" bird in programs as well as encouraging natural behaviors for birds housed together. Most importantly, during the off-season or slow seasons, these education birds can be paired for breeding – thus increasing their functionality for the institution. After the breeding season, the birds can transition easily back into their programming roles. This presentation will discuss collection planning strategies and a case study examining the challenges and successes associated with utilizing this approach for Eurasian Eagle Owls. The case study will follow the introduction of two adult education birds, breeding, and the subsequent hand-raising of a Eurasian Eagle Owl chick – the first to be bred at an AZA facility in the last 5 years.

The National Aviary is an AZA accredited facility that houses over 500 birds and represents over 150 species. The education collection currently has 72 birds. The birds are used for in-house and outreach programs, free flight bird shows, media appearances, and guest interactions.

Previously, the education department utilized a more traditional approach to housing program animals. Most of the animals were past pets, birds from wildlife rehabilitation centers, or birds that were unsuitable for exhibits. Essentially, for ease of training and care, all birds were housed singularly in separate cages. Over the last several years, the education department has experienced very successful group management of social species in the collection. Parrots, vultures, gulls, and kites have been housed and worked together in groups; adding a new dynamic to shows as well as allowing the birds to display more natural behaviors while in their enclosures. Parrots in particular have thrived under this style of management – they can bond with each other, allopreen, and enrich each other's lives overall. Additionally, it limits bonding with people, decreasing aggression and increasing consistency. This applies even to same sex pairs and is still helpful even if not planning to breed.

Having two of the same species can prove to be very beneficial to an education or show collection. For social birds, facilities can conserve space and resources when two birds are housed together. Multiple birds allow for redundancy in programs and shows, effectively providing "understudies" for routines and programs. The birds, in turn, are provided more freedom and flexibility. A bird can choose not to work or opt to have a day off and trainers do not feel pressured or obligated to get the bird working. Techniques like baiting or increasing the amount of reinforcement may work in the short term but can eventually lead to a break down in behaviors. Having multiple birds trained to do the same behavior will decrease the pressure to get any one bird to perform. Birds can rotate on and off of feed-up, be available for medical procedures or treatment, be trained to do additional behaviors or be retrained if a behavior is breaking down. All this and the audience will never know that one of the stars is taking a day off.

Pairs of birds can also be set up in the off-season to breed. Traditionally, education animals were not used for breeding because they needed to be available to work for programs. Trainers were also worried that they would not be trainable again or, conversely, that trained show birds are not suited for breeding because of their comfort with people.

While pulling birds off of shows for breeding can be a challenge, it is vital that show and education departments start doing so. The number of available bird species for education programs today verses ten years ago shows an obvious decline in the number of species available. Species that were previously common are now scarce because most of the animals are being housed separately for programming and are not being bred. Combined with changes in importation laws and an aging population of some species, the overall result is a loss of species diversity as well as a decline in the number of individuals available for future programming. Species managed through AZA species survival plans are mostly breeding for exhibits while program animals are not being considered. It falls to education departments to look out for the future of their collections – unless education departments and shows progress with breeding these species, they will slowly disappear from our presentations.

Using birds that were former pets, rehabilitated, or sourced from the private sector (such as falconers), can lead to several problems. Pets may come with a variety of behavioral issues. Most rehabilitated birds cannot fly well and are available only intermittently. The private sector can be very limited and can be challenging to work with, depending on your facility's needs. Programs and shows highlight global environmental issues and a variety of species are necessary to tell the conservation stories that we must tell. Educational trainers need to start thinking about acquisitions differently. One of the most readily available options would be to breed birds already available in the collection. Pairing up current birds or acquiring two unrelated birds for future breeding needs to be considered whenever collection planning is discussed.

There are many benefits to breeding trained collections. Birds housed together during show season do not need a long introduction period to breed. Not only are they more comfortable with each other, these program birds are also more comfortable with their trainers working around them when sitting on eggs and checking up on their chicks, which can result in lower mortality rates for eggs and chicks. Additionally, show birds have a proven track record of being "good" birds to work with, and it makes sense to breed from reliable stock. Just as dog breeders breed for certain traits, temperaments, and reliability, so can zoological institutions. Breeding our educational program animals ensures that these species remain available for similar programming and shows in the future.

The National Aviary has had great success working and training Eurasian eagle Owls (*Bubo bubo*). The education collection had 2.1 Eurasian eagle owls in 2011 and 2012. The female "X" is unrelated to the two male owls, while the males, "Gandalf" and "Dumbledore," are siblings. All three owls are scale and crate trained. They sit on a glove or free fly indoors and outdoors. All three owls had been hand raised. They have 8-10 years of show experience.

In late 2011, Gandalf and X were put into two enclosures with only cage wire in between them so they could see and hear each other for a few weeks. They were then introduced into a single large enclosure with a breeding platform. There was no courtship or breeding behavior observed over a four month period, after which they were returned to their individual enclosures and used again for shows. In November of 2012, X and Dumbledore, the other male, were introduced in the same way. Within one week, courtship behavior was observed. On February 7, 2013, trainers observed that there were three eggs on the nesting platform. Eurasian eagle owl eggs are generally laid every other day and the eggs were candled after two weeks of being parent incubated. Two eggs were viable and one was infertile. X was sitting on the nest and Dumbledore was observed feeding her, but trainers also tossed her additional food to ensure she was receiving enough. On March 9, the trainers found one dead chick on the ground under the nest platform. A necropsy was performed and results indicated that death was due to trauma. The third egg was pulled and placed in an incubator. The chick hatched successfully on March 13, 2013 and was hand raised by trainers. "Pumpkin" was the first Eurasian Eagle Owl chick hatched in an AZA

facility in the last five years. She currently flies in shows and educational programs. After the breeding season, X and Dumbledore were back performing in shows by April 10.

In October of 2013, X and Dumbledore were once again put into an enclosure together, this time without the initial period of being in adjoining enclosures. There was no aggression and courtship behavior was observed within a few days. When checked on December 27, there were a total of three eggs in the nest. The eggs were candled and all three were fertile. A few weeks later, the eggs were candled again because of the extreme weather conditions associated with the polar vortex. We gave the owls supplemental heat but had to be careful that we did not cause her to abandon the nest. At that time, two of the three eggs perished. Trainers speculate that it was due to the extreme cold. Again, just as in the previous breeding season, the third egg was pulled and put into an incubator. It hatched on January 29, 2014, and was hand raised. This youngest owl, called "Tootsie," is being shipped to another facility for use in education programs. X and Dumbledore were back in shows in March.

Even though two Eurasian eagle owls were unavailable for shows for a few months, the benefits far outweighed the inconvenience. The addition of the first chick in 2013 added an additional owl to the collection without the costs of acquisition, shipping and quarantine. The second chick allowed the educational show department to trade for a new bird to add to the collection, which helps the acquisition budget. The hatching of an owlet was big news and the marketing department was able to host media events surrounding this occasion. Tootsie was also put into a window that allowed for public viewing for a few hours a day, which helped to increase attendance during the slow winter season. The breeding of the Eurasian eagle owls was such a success for The National Aviary that we are planning on breeding more in the future with several other potential species such as Black Kites, Silver Gulls, Peregrine Falcons, and Lanner Falcons. The parrots in the collection are very readily available, so there are no plans to breed them at this time. The next breeding project will focus on Hooded vultures. Not only are they helpful tools to educate the public about the vulture crisis, the Hooded vultures in the National Aviary's collection are also wild caught and therefore genetically valuable. Their genetic variability would be wasted without offspring, so it is imperative to use them for breeding.

Many education collections face challenges in the form of holding space, time constraints, high program demand, and limited staffing. While these will always factor into collection planning, there are a number of benefits to thinking about the future of your bird species and the potential benefits of breeding them. Thinking creatively about where and how you house your birds may open up new opportunities, especially if you can potentially breed some of these dwindling species. Not only is it enriching and natural for many social species to live together, but breeding birds is critical for long term sustainability. The work that education and show birds do is invaluable – and we want to make sure these species are around for future generations to enjoy.

Success in Voluntary Blood Draw Training with Orangutans Using a Proactive Program

Laura Laverick
Theresa Larson and Emily Gertiser
Cameron Park Zoo

When caring for apes in captivity, the most useful tool in terms of their health care is a strong training program. The list of behaviors and voluntary procedures that are possible are limitless. The Cameron Park Zoo in Waco, Texas houses 2.1 orangutans, 1.1 Bornean (Pongo pygmaeus) and 1.0 Hybrid (Pongo pygmaeus x abelii). A successful training program has been implemented using only positive reinforcement techniques. Body presentations, urine collection, ultrasound, intramuscular injection, as well as desensitization to various medical items like thermometers or stethoscopes are all components of the maintenance behaviors performed with the orangutans. Moving forward to advance proactive health care of these apes, a blood sleeve was installed for voluntary blood draw training in May 2013. In a relatively short period of time, a sufficient amount of blood was successfully collected to perform a complete blood count and serum chemistry panel on both of the adult male orangutans. The blood draw on "Kerajaan" was successful at exactly 3 months and on "Mukah" at 4 ½ months. The set up and training process for this behavior are what led to these quick and productive accomplishments with the males along with continued progress with "Mei," the female.

Blood Sleeve Set Up

One sleeve is used for all of the orangutans, male and female. The sleeve itself is made of 2 inch by 2 inch mesh. It is thirty-eight inches in length and a square of 7.5 inches in height and width. It connects onto the stall mesh through a port that is a 12.5 inch square with the actual opening inside the frame being a 10 inch square (Picture 1).

There are a number of benefits in using this type of full mesh sleeve over the more common PVC type sleeve. It allows for more flexibility in training of the behavior and can be adapted for different modifications for individual orangutans. Finding the vein versus the position of the orangutan's arm is found to be easier since various parts of the arm are accessible from any angle. The openness of the mesh permits the orangutans to see what is being done at all times and this seemed to make them more comfortable in moving forward through shaping steps which ultimately accelerated the training. It also provides an increased amount of safety aspects while performing this procedure.



Picture 1 – Blood Sleeve Set Up with Mukah Modification (Photo Credit: Laura Laverick)

A modification to the sleeve was used to aid our hybrid male orangutan, "Mukah," in holding his arm position for the blood draw. His arm placement is slightly different while in the sleeve and therefore a section of halved PVC pipe was added using nuts and bolts. This moved his arm closer to the mesh for the vein to be reached (Picture 1). It was also easily removed or readjusted from the bottom or either side.

Training Steps

Stage 1

The first step consisted of giving the orangutans their diets and treats in the sleeve until they were comfortable reaching in and out to different lengths, desensitizing them to the sleeve itself. Their "fingers" behavior was then utilized, getting the orangutan to put their fingers in various positions throughout the sleeve. "Grab It" was then shaped where the orangutan would have a good hold on the mesh at the end of the sleeve, working the holding time period longer (preventing them from just grabbing and letting go). The trainer would keep one hand on the top/outside of the orangutan's grasped hand so that any movement could be detected as soon as possible. Once they consistently held their grasp, "Inside" was shaped. This behavior consists of the orangutan pressing their forearm up against the mesh in the area of the vein (Picture 2).



Picture 2 – Grab it and Inside
(Photo Credit: Kels Kaiser)

Stage 2

Once this position was established, a secondary safety person was brought in. This person was responsible for assuring the orangutan continued to have a firm hold in the desired position so that the trainer would be able to focus on the orangutan while also making sure that nothing came within the orangutan's reach. At this point in the training, all the cues and communication with the orangutan came from the primary trainer to lessen confusion on the orangutan's side of the training. Once the primary trainer had the orangutan in the desired position, he/she would tell the safety person a verbal "ready". After this was communicated, the safety person would replace the trainer's hand with their own on top of the orangutan's grasped fingers (Picture 3). The trainer could then focus on desensitizing the orangutan to gauze, alcohol, blunted needles, sharp needle sticks, etc. (Picture 4). If the orangutan started to lessen their grip or hold, the safety person would tell the trainer "they're moving" to indicate they were wiggling the fingers or starting to ungrasp. If the orangutan let go, the safety person would simply say "break", allowing all personnel to remove themselves from possible harm's way. If this was communicated, the trainer



Picture 3 – Passing off to the Safety Person
(Photo Credit: Kels Kaiser)

Picture 4 – Desensitizing to a Needle Stick
(Photo Credit: Kels Kaiser)



would re-cue and position the orangutan and then pass them back off to the safety person. The safety person would hold the previously mentioned responsibilities until the orangutan had been bridged and then they were free to release their physical contact.

Stage 3

The last step in the training was bringing in a veterinarian or veterinary assistant to work on doing the actual desensitization to the gauze, butterfly needles, and drawing blood. The orangutan was usually given a continuous reward from the primary trainer while the veterinarian or veterinary assistant was working on their arm. It was discovered however, that the orangutans held better and appeared less nervous when they could actually just hold and watch the procedure on their arm and then get a large reward at the end. An overall hold of about 5 to 7 minutes was worked up to for each repetition. Most sessions were not more than 2 or 3 repetitions. Over the 3 month training period, 1 to 2 sessions were done per week. Sessions varied between all three stages so that the orangutans did not associate working in the sleeve with attempted venipuncture every time and no more than one venipuncture was performed per week to prevent the formation of scar tissue.

Success!

Using these training steps, Cameron Park Zoo has been successful to different degrees with all of the orangutans. In exactly 3 months to the day, 5 milliliters of blood was collected to run a complete blood count and serum chemistry panel on the adult male Bornean orangutan, "Kerajaan" (Picture 5). In 4 ½ months, 6 milliliters of blood was collected to run a complete blood count and serum chemistry panel on the adult male hybrid orangutan, "Mukah." A dry stick has been worked up to with the Bornean female orangutan, "Mei" (who has a severe needle phobia). It is believed that the sleeve, set up, and training plan along with Cameron Park Zoo's supportive staff is what led to the great accomplishments within the voluntary blood draw training.



Picture 5 – Successful Blood Draw with Kerajaan
Left to Right:
Dr. James Kusmierczyk, Kerajaan, Krista Havecker-

Moving Forward

Having blood draw training in place is a huge asset, as it can be a tool in monitoring health of aging apes in captive care due to the fact that cardiac related disease is a serious concern in the ape population. This training will continue with all of the orangutans (as a maintenance behavior with the males) and shaping will continue with the female. There are hopes that in the near future that a blood sample will be collected on "Mei." The sleeve is also being used to start training for voluntary blood pressure readings. Cameron Park Zoo is on the next order for a Tuff Cuff through the Great Ape Heart Project based out of Zoo Atlanta. It is exciting to continue to push the training envelope and be proactive with a successful program to better the care of the three orangutans housed at Cameron Park Zoo!

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Marty McGee Bennett's Camelid Handling Secrets

Marty McGee Bennett
CAMELIDynamics

Many management and behavior problems encountered with llamas and alpacas (be it in a zoo setting or private farm setting) can be solved with thoughtful antecedent arrangements. This talk will outline and discuss the connection between the traditional handling techniques used with llamas and alpacas, and common behavioral issues. I will illustrate how these problems can be eliminated or managed successfully with clever changes to the environment and approach to handling.

For example:
** The use of an optimally sized catch pen.*
** The use of smaller pens as well as specially shaped pens for management tasks that require more containment in place of physical restraint*

I will discuss specialized catching tools and techniques, such as using balance to desensitize the camelid to a human's approach, thereby making the animals less flighty, more useful in a public setting and easier to manage for herd health tasks.

I will describe techniques such as:
** The very precise offering of an escape route inside a small area and how this technique can be used in place of food reinforcers to avoid fearful reactions.*
** Selective use of crowding with multiple animals to accomplish medical tasks such as giving injections or management tasks such as trimming toenails.*

The talk will also include specific very useful information about the critical importance of halter fit for camelids. As semi-obligate nasal breathers with an upright posture and small heads and long necks, improper halter fit is a huge problem whose ramifications are often misunderstood.

The information in this paper should really be top secret. You shouldn't really be able to know these things until you have paid your dues. By rights you should be pitched into the dung pile a few times, wear a lot of spit and know the feeling of being dragged around the paddock on your face once or twice before you gain entry to this inner sanctum. Fortunately for you I never could keep a secret! These simple tips and techniques will make you look like a veteran animal handler as soon as you try them. You need not begin at the beginning or keep reading until the end. You don't have to understand or agree with any particular philosophy. The following list is a compilation of tricks of the trade that will help you work magic with your animals immediately. Newcomers to the camelid business will want to laminate this article and put it in the barn. If you have been at the camelid game for a while you may already know some of this secret knowledge, but read carefully and you may find one or two new nuggets of wisdom to add to your "toolbox."

Herding

Using a special word, noise or whistle to call your camelids into the barn at mealtime is a great way of getting them in the barn, but be aware of the dangers of creating a "calling pattern". Periodically call the animals in at two in the afternoon or ten at night and give them food

when you do. You won't be faced with a group of llamas or alpacas looking at their watches and shaking their little heads when you holler the magic word at the wrong time of day.

When threatened, an animal's first choice is to get away—the flight response. All mental circuits are focused on finding an escape route. Herding a group of animals is actually the same as creating an escape route for the animals that suits you. Camelids will instinctively orient themselves so that they have a forward escape route relative to any perceived threat. Before you begin herding look at the process from this perspective and block all exits except the one leading to the desired location.

When moving animals into or through small spaces and particularly when moving around frightened or shy animals, be aware that you are larger than you think. Remember, to a camelid you are as big as the physical space that you occupy and your reach (reach=your body and the length of your arms). You will make major points with your animals, especially nervous ones, if you keep yourself at a safe (length of your arms included) distance as you work around them.

When sorting animals, it is very helpful to have two or more levels of confinement. Small catch pens that join a slightly larger area are much more useful than a single tiny catch pen in the corner of a huge pasture. It will be much easier to herd the animals into the secondary container. There will always be those animals that sneak by when you are working them into the smaller catch pen, and with an intermediate container you will not have to start over in the big field.

If your pasture is too big to manage alone you can build a temporary fence into the middle of the pasture to create an area you can work with. Fiberglass fence posts and nylon tape makes a visible barrier and can be taken down easily for pasture maintenance. You may be able to manage smaller pastures with a length of rope or flat nylon tape (40 feet works well). Simply tie the rope or tape to the corner of the pen, walk out with it, and round up the animals. Never try to confine animals in a corner with no escape using a rope - they will almost always choose to rush it and you will end up with animals caught in a rope and a sore hand!

When herding with more than one human, both herders must remember the effect of their reach. Gate tenders should stay as far out of the way as possible. You would be amazed at the difference one giant step backwards will make. At clinics I have helped someone move an animal that was absolutely stuck simply by asking a bystander to move back a bit and open a gate slightly. Your camelids are acutely aware of human anatomy and will pass easily if the human is more than arm's length away from the path the animals must take. It is also better if your gate tender is standing behind the gate instead of on the animal side of the gate. It feels safer for the animals to pass through a gate if the gate is in between the human and the animals.

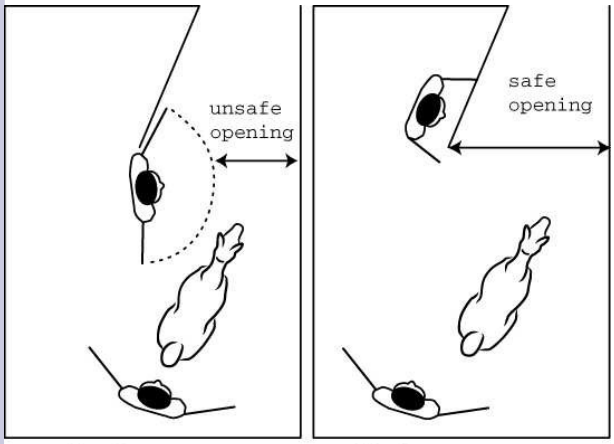


fig.6

fig.7

Catching

Use a catch pen! Build or buy panels to create a sturdy, safe, confined area (approximately 10′ x 10′) in a convenient spot accessible from your pastures. Herd your animals to this pen each time you halter or work with them. If you have any trouble with any particular technique or task while working in the pen try making it smaller by stacking bales of hay or straw inside the pen.

Try catching difficult animals (wild or spitty animals in particular) in the catch pen by using a wand and rope. I make a special set of tools but you can try the technique by tying a rope to the end of a stick (a four-foot dowel will work). Use the stick to guide the rope over the head.





Once the rope is around the neck you can control the head but still allow your animal to move within the catch pen. Use the rope to steady your animal as you walk up to him with the halter.

Haltering

If your animal is having difficulty with initial halter training try this: Buckle the crown piece of your halter on its largest hole and offer this large opening as if it were the nose band of the halter. Sometimes a few practice attempts with this much larger opening can pave the way for actually putting the nose band over the nose.

Check your halter fit! Halters that don't fit are dangerous, create behavioral problems, and don't work well for their intended purpose. Your halter is probably lacking if the noseband cannot be adjusted. A properly fitting halter rides up high on the nose bone close to the eye and stays there regardless of what the animal does. A properly fitting halter is safe and comfortable. The





noseband rests firmly on bone and stays there NO MATTER WHAT. There is enough room in the noseband for the animal to chew without interference.

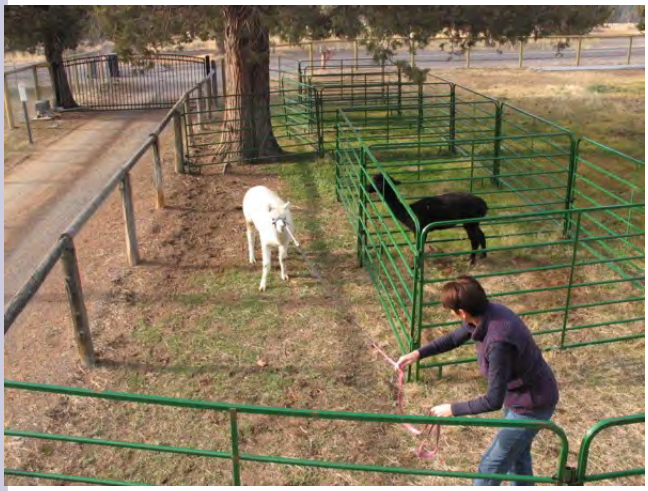
Before you put any halter on, always open the nose band so that it is larger than you think you need. Snug up the crown piece. Make this adjustment tighter for animals with smaller heads. Take the slack out of the noseband. Larger animals need more room. Always physically examine the nose bone before you put a halter on an animal you don't know - some animals have shorter than average nose bones. Recheck halter fit after about ten minutes.

Leading/Loading

If you pull steadily on your camelid he will pull steadily back. You and your animal will

be counterbalanced. No productive movement will result from this counterbalance. Llamas and alpacas learn very quickly to widen their stance, drop their head and grow roots. Camelids commonly learn to cush as a reaction to the steady pull. Use intermittent signals with a mini release in between each signal and continue giving them until the animal loses his balances and moves.

Use a longer lead for initial lead training. Remember, we teach camelids in many different contexts (herding and catching) to move away from our approach. Suddenly you want the animal to go with you instead of away from you. This is a new skill and one that requires teaching! I like a lead that is about 17 feet long. Getting further away makes your llama or alpaca feel safer and more likely to try walking with you. If he does bolt you have more time to react with a longer lead.



If you have a long narrow aisle way, use it for your first few leading lessons. You can keep control of your animal more easily, and leading in a long narrow pen encourages your animal to walk in a straight line behind you rather than all over the place.

Loading a difficult animal. Most camelids would rather not get in a confined space with a human and will load in a trailer or other conveyance much better if they can get into the trailer themselves without being led in. Spot the trailer by the entrance to a barn and use panels to block any exit other than the trailer door. Herd the llama or alpaca into the trailer. It will be much easier to herd a group of animals into the trailer releasing the ones you don't need rather than trying to load a single frightened animal.



When asking a llama or alpaca to stand still for some reason, help him stand still by watching for weight shifts in the front half of the body. Pay very close attention to the front feet and use your lead to keep the weight evenly distributed on both front legs. If the animal's weight is more over the right leg move the head and neck to the left and release- weight over the left leg move the head and neck over the right leg and release. You must correct and release or your animal will begin to lean on the leadrope and you will end up fighting with him. Your camelid will be much more likely to stand still using this technique than if you try to hold him still using force.

Do you have an alpaca or a llama that has trouble paying attention on the lead? Try walking him over 5-6 parallel poles on the ground spaced about 3 feet apart. This will often help a scattered animal learn to slow down and focus.

Management

Try giving subcutaneous injections using the group method. Cram as many animals as you can into your catch pen- the animals will feel safer in a group making the job easier from a purely psychological point of view. But the advantages don't stop there. With enough animals in the pen



you don't have to restrain them as you give the injection. The shot recipient can't move very much because of the proximity of other animals. Stand behind the animal's eye on the side of the animal closest to the center of the pen and use an injection site in the front half of the body- the crease of the neck works well. This is not only easier for the animals but a real time saver for the manager.

If you use a restraint chute (I prefer the techique described above) add a butt board to it. Tie a frightened llama or alpaca in a chute by the head and he will more than likely throw himself around, flip over, end up forward of the shoulder restraints or lie down. A camelid's long neck makes it difficult and dangerous to restrain him by the head. Add a rear barrier to your chute, tie your animal loosely and your chute becomes a very tiny catch pen instead of a restraint device. Both llamas and alpacas will remain calmer when contained than when restrained. ***Always double check halter fit when using a chute!

Don't have a chute? If you have a trailer use it for the chores that you would normally do in a chute.

Are you nervous about giving an injection for the first time? Forget the orange—practice on a chicken! Get a whole chicken at the grocery store with the SKIN ON. Practice both sub-Q and IM injections with a variety of substances- soy sauce is just like Tetnus C/D, honey is very similar to ivermectin. Try a variety of needle sizes. You will get a much more accurate idea of what to expect on a real animal. You can even bake and eat your chicken after you practice.

Difficulties picking up feet to trim toenails? Don't bother picking up the feet at all! Stand the animal on a rubber mat or concrete pad and trim the long parts of the toenail while the animals stands on his feet. It may not be the perfect answer but it is possible to do a fair job of trimming toenails this way and this technique can keep you out of a fight with your animal. A helper can steady the animal as you squat down and work, if your animal kicks you may want to use a panel as a boundary reaching under the bottom rail to trim. Another alternative for quieter llamas or alpacas is to steady the animal by putting your hand on the shoulders or hips while reaching down with the other hand to trim. When using this technique it is best to nibble away at the nails rather than taking off big hunks. Pruning style toenail trimmers work best for this technique.

Husbandry

If you ever have to milk a female camelid this trick comes in very handy. Cut off the needle end of a 20cc syringe and insert the plunger in the wrong end- the end you just cut off. You now have a breast pump. You can put the smooth end with the rim up against the teat, draw back with the plunger and you are milking away.



Work with your babies early (3 to 4 days old) and often (once a week). In the first three months 2-3 minutes per session is enough. Work in a catch pen with mother present; handle the mouth, tail and legs

while the baby stands in balance unrestrained. Allow the baby to move freely in the catch pen and move with him as you work

Beware of young llamas and alpacas that enter your personal space. Male or female camelids that pull on your clothes, make physical contact with you or stand in your way without yielding the right of way are heading down a dangerous path. Don't encourage this behavior and learn more about how to respond appropriately. Whatever you are doing remember to BREATHE!

Training Emergency Recall in Multiple Species

Tara Gifford
Ohio Animal Training LLC

Being prepared for emergencies is a part of any zoo's protocols. There are many types of emergencies that can occur at a zoo involving people and/or animals. Having a plan to get dangerous animals off exhibit in the event of bad weather, animal escapes or an unwanted addition to an exhibit is a part of good management. Training animals to carry out an emergency recall can save precious time and potentially save lives. This paper will discuss the training process of big cats, bears, apes, large hoof stock and reptiles for a behavior to bring them off exhibit and secure them in a holding area. Training for a quick response at any time of day in the presence of distractions has proven to be a valuable tool.

Creating a Heart Healthy Mate

Christina Eastwood
Dallas Zoo

The Dallas Zoo holds 1.1 Red River Hogs which are recommended for breeding by the AZA Species Survival Plan (SSP). The pair, 1.0 Hank and 0.1 Riley, have bred on multiple occasions since December 2011 but have not produced offspring. In an attempt to stimulate a more successful breeding program with our Red River Hogs, a goal was set in June 2012 to transform our male into a heart healthy mate. To achieve this goal, the trainers decided the best method would be to train a behavior that would not only assist with weight loss, but would also be educational for the visitors. We chose to train a running behavior that would be shown on exhibit during visitor hours, along with other natural behaviors. A shaping plan was written and executed until the final behavior was completed in May 2013. The combination of his training and a new diet allowed him to lose 17.8 kg over an eight month period. Hank reached his ideal weight at approximately 87 kg. The Dallas Zoo is anxious to see if Hank's new exercise program will have a positive impact on the pair's breeding success.

Introduction

The Dallas Zoo currently houses 1.1 Red River Hogs (*Potamochoerus porcus*) in the Giants of the Savanna section. These hogs were given a breeding recommendation by the AZA Species Survival Plan (SSP) coordinator. The male, Hank, transferred into the collection in 2010 at the age of 7 years old. Hank had been housed with other females at previous facilities, but was only seen mounting on one occasion (MedARKS, 2008). The female, Riley, has been at the Dallas Zoo since she turned 2 years old in 2008, but has never been pregnant. She showed physical signs of being in estrus by presenting for the previous male in the Dallas Zoo's collection, but he never attempted to breed with her. (L. Fitzgerald, personal communication, April 12, 2014).

This current pair has been housed together since May 2010. Red River Hog breeding season is in the cold, wet months which typically last from September to April (Long, 2003, p. 380). The hogs first showed breeding behaviors in December 2011. Breeding was seen on multiple days in December; however, there was not much activity for the rest of the breeding season. In an effort to increase breeding activity, the keepers started researching methods to increase the amount of breeding interactions. We decided to start with one of the suspected reasons for breeding failure: being overweight.

In June 2012, Hank weighed 104.8 kg and was estimated to be about 17 to 19 kg overweight. We set a weight goal and devised different methods to help him achieve his new ideal weight of 87 kg. We added an exercise program to his daily routine that could also be used during public training demonstrations to highlight natural hog behaviors.

Hank also experienced a hoof injury when he arrived at the zoo. It was hoped that this new training behavior would also help improve the condition of his hooves by naturally wearing them down. By losing weight and conditioning the hooves, we hoped it would reduce any physical stress he might be experiencing in mounting the female.

After 3 months of trying the new exercise behaviors, he was still not losing weight. Subsequently, his dietary quantities were decreased in September 2012.

Training

The exercise behavior we chose to train was a "run" behavior. This behavior entails the

individual to run a lap around an island in the middle of the exhibit. The individual is required to maintain a jogging pace, at minimum, during the lap to receive the reinforcer for the completed behavior. The reinforcers used were from his daily diet. The highest value reinforcers were produce items and grain. The grain was used to make the reinforcer larger during the shaping process since it is such a high energy behavior. Up to three trainers were used during the shaping process depending upon his progress. Each trainer was equipped with a target stick and produce, which was used as both a reinforcer and a baiting tool. The verbal cue, "Hank," was also used as a luring tool to shape this behavior. The bridge chosen to train this behavior was a verbal cue, "good."

Shaping Plan

The behavior started out as an A to B type behavior. One trainer (A) stood at the front viewing glass and a second trainer (B) was in the service stairwell to the exhibit. (Figure 1) Trainer B would give the verbal cue, "Hank." Once he arrived at the required point, the trainer would give him the verbal cue, "target," while holding the target stick within his reach. When he touched the target with his nose, he was bridged and reinforced. Trainer A would repeat this same step and Hank would go back and forth between the two trainers while getting reinforced at both locations. Once Hank understood the behavior, the reinforcer was taken away at trainer B's location.

Trainer B was then relocated to the back viewing window location. (Figure 2) The same method was used, but it was a further distance. The visual arm cue was also added during this stage. Trainer A's right arm was pointed downwards, parallel to the body, then moved in an upward sideways sweeping motion until the arm was pointed towards the sky. (Figure 3)

After completing this stage of the behavior, a third trainer (C) was added by the keeper exhibit door from the barn. (Figure 4) During this step, trainer A would give the visual cue, while trainer B gave the verbal cue, "Hank," and presented the target stick within his reach. Once he targeted, he was reinforced and given the visual cue again by trainer B. The trainer then threw a piece of produce in the direction of trainer C. This is an important step because Hank cannot see trainer C from this location. Once he started running in the right direction, trainer C gave the verbal cue, "Hank." Hank then targeted and got reinforced at trainer C's location. Finally, trainer A gave the verbal cue, "Hank," and gave him a large reinforcer once he returned to the front exhibit glass and targeted.

This step was continued while trying to eliminate some of the lures during the process. Depending upon his progress, the produce baiting, the verbal cue, "Hank," and the target sticks were slowly removed over time. The verbal cue, "run," was slowly worked into the process while the verbal cue, "Hank," was phased out of the process. The visual cue was continued during this transition.

Eventually, trainer C was removed and the lap was completed with just two trainers. (Figure 5). The biggest challenge for Hank was starting the behavior, but once he got to trainer B, he would complete the rest of the lap on his own.

Soon after, he became comfortable with the "run" cues, both verbal and visual, trainer B was removed from the process. As of May 2013, Hank was reliably doing the "run" behavior to its full criteria. The exhibit has changed since the behavior was completed. Hank can now choose to go through or around the permanent burrow, as long as he completes the loop around the island. (Figure 6)

Other Exhibit Behaviors

Along with the new "run" behavior, Hank has been trained other natural exhibit behaviors. These behaviors accompany the "run" behavior in the daily exercise that Hank receives. The behaviors also educate the public about this species and their capabilities. We now use all of these

finished behaviors in training demonstrations for the public. Some of these behaviors include: push, station, root, and wallow.

During the "push" behavior, Hank will select a nearby log and push it with his snout rolling it over the dirt until bridged (approximately 3 s). This behavior demonstrates how hogs move logs and rocks around in search of food. It is also an excellent demonstration of their strength especially when a larger log is chosen.

During the "station" behavior, Hank will find his designated station stump and place his two front hooves on top and hold until bridged (approximately 8 s). This becomes a good time to talk to zoo visitors about the intelligence level of hogs and body condition scoring. This behavior is really important for Hank because it requires him to put more weight on his back hooves. It is a great way to strengthen his back legs and feet to better prepare him for breeding.

During the "root" behavior, Hank will walk to the dirt, start pushing his snout in the sand and move it around in a forward shoveling motion. This is an excellent way to demonstrate one of their most natural food searching tactics. It demonstrates the strength in their snouts and is a good time to talk to guests about the type of diet they consume.

During the "wallow" behavior, Hank will lie down in the closest wallow and wiggle his body around slightly. This behavior has not been completed yet but has been captured on multiple occasions. Hank demonstrates his need to keep cool in the hot Texas sun, which closely mimics African climates. The public is also taught about the need for wallowing in mud as a sunscreen and bug repellent. All of these behaviors combined with the "run" behavior create a very educational training demonstration and a healthy workout for Hank. It allows him to work on toning multiple areas of his body.

Diet

Before the diet change in September 2012, Hank was receiving a pelleted grain, a variety of fruits and vegetables, and free choice coastal hay. The pelleted grain he received was 1,900 g of Mazuri ADF 25. The fruits and vegetables included: 340 g of sweet potato, 113 g of carrot, 113 g of apple, 170 g of grapes (twice a week), 1 whole banana, 227 g of novel fruit or vegetable, and 624 g of romaine lettuce. There were gradual modifications made to the diet over the following year. We paid close attention to Hank's weight while making these modifications so he could lose the weight in a safe time frame. The final diet that keeps him at his current weight of 87 kg includes most of the same components at smaller quantities. He now receives 1,500 g of Mazuri ADF 25. The variety of fruits and vegetables were decreased to the following: 204 g of sweet potato, 25 g of carrot, 103 g of apple, 38 g of novel fruit or vegetable, and 562 g of romaine lettuce. The banana and grapes have been completely taken out of the daily diet to reduce the amount of sugar intake.

Results

The new training steps were started in June 2012. During the following year, Hank continued to advance through the training plan until completion in May 2013. While learning the "run" behavior, Hank stopped gaining weight, but was not losing any weight either. He was staying at a steady weight of 104.8 kg. The revised diet was started in September 2012. The combination of the two allowed Hank to achieve his new weight of 87 kg in June 2013. He lost a total of 17.8 kg over an eight month period. Based on his body condition score, 87 kg was determined to be his ideal weight after discussions with the zoo's nutritionist and veterinarians. Due to the new healthy weight that was obtained, we hope to see an increase in breeding activity between our male and female pair.

Breeding Changes

The first sign of breeding between our Red River Hog pair was witnessed in December 2011. Breeding was witnessed multiple days throughout the month. Three of the accounts were within 4 days of each other while the other two encounters randomly occurred that month. Two other breeding activities were seen during the 2011-2012 breeding season in March and May. The "run" behavior started in June 2012. When breeding season started in September, Hank had already advanced to the stage of requiring three trainers for this behavior. The pair bred for 3 days in a row in December 2012. By this time, we started removing trainer C from the training process. Breeding was also witnessed 2 days in January within the same week, 1 day in February, and 2 consecutive days in May. This is an increase from five to eight breeding encounters between the two breeding seasons. There were multiple breeding behaviors seen during the same estrous period, as well. During the 2013-2014 breeding season, there was an ice storm in December that may have occurred during the female's estrous period. The hogs were in separate stalls in the barn during this timeframe and we may have missed out on a breeding opportunity based on their previous reproductive patterns. Even though the season is not over yet, the pair bred for 3 consecutive days in January and 2 days within one week in February. No breeding behaviors were witnessed in March. There seems to be a slight increase in Hank's response towards breeding over the last 2 years. The duration of mounting has also increased. Hank mounted Riley for 3 to 5 minutes during the first breeding season and he has now been seen mounting as long as 15 minutes. We hope to see this trend continue so we can produce our first litter of Red River Hog offspring.

Acknowledgements

Thank you to the North Savanna staff, Jeremy Dillon, and Carnivore staff for assisting with training sessions and support. Kerri Slifka, the Dallas Zoo's nutritionist, for working with our staff to adjust Hank's diet on multiple occasions to get him to his ideal weight. Special thanks to the Dallas Zoo for their continued training support.

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Figure 1

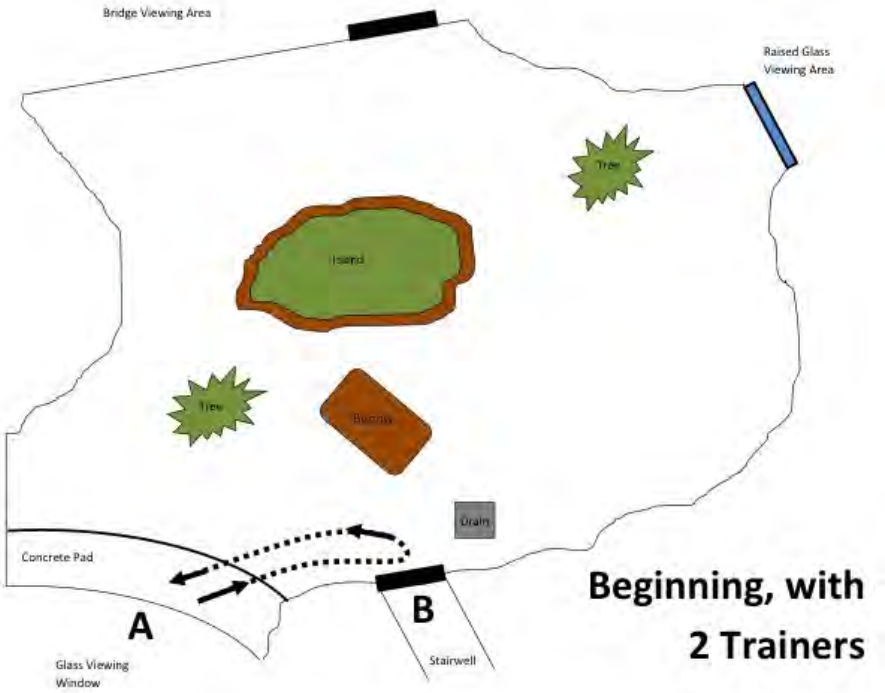


Figure 2

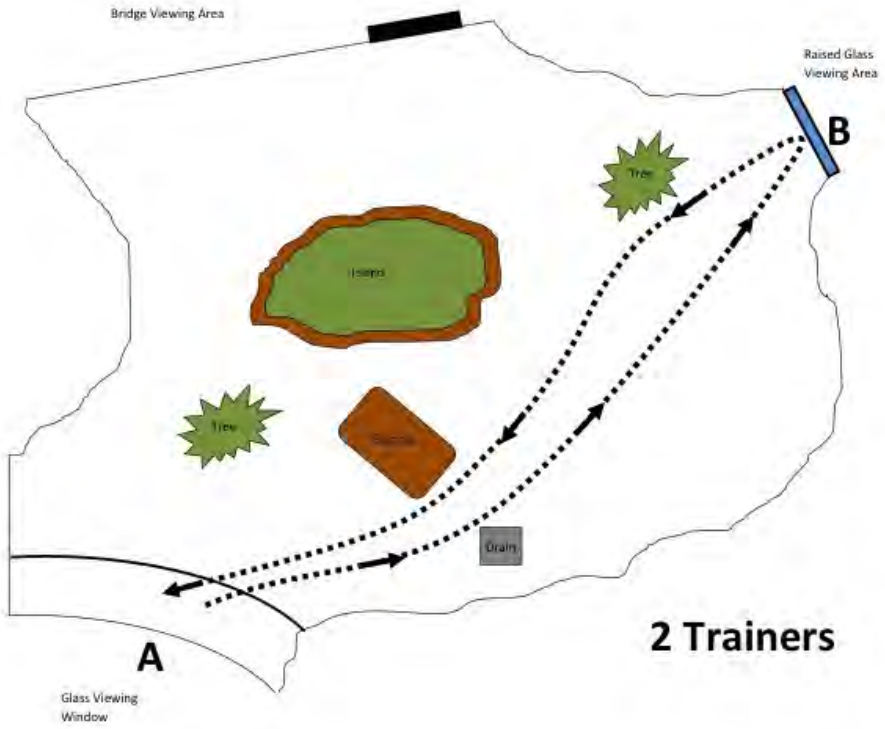


Figure 3



Figure 4

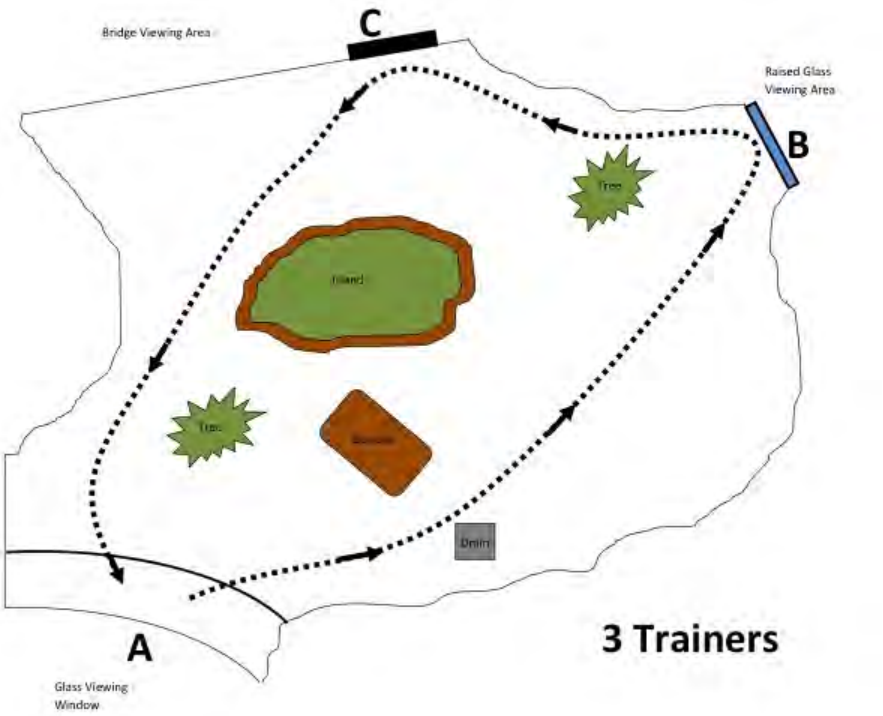


Figure 5

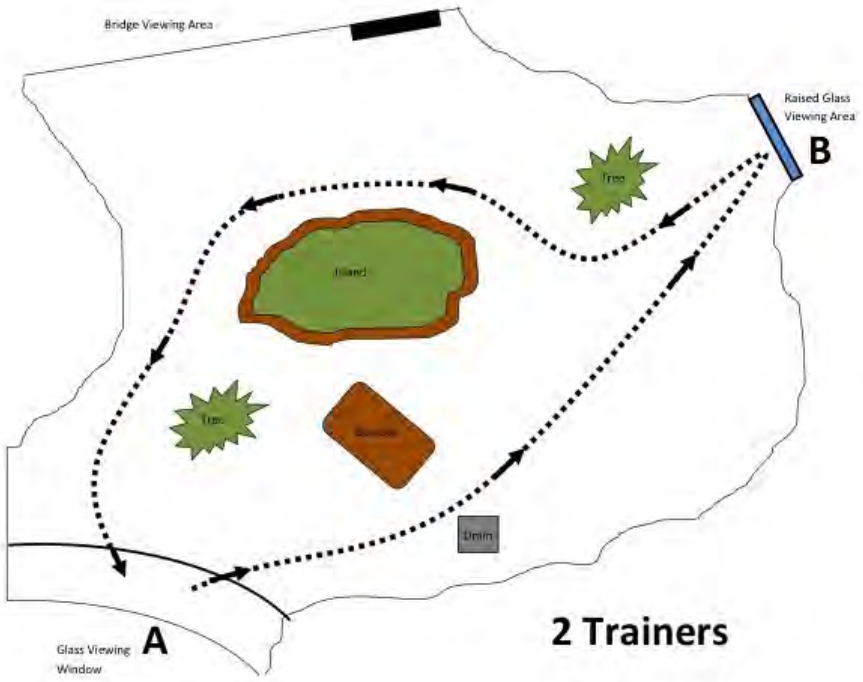
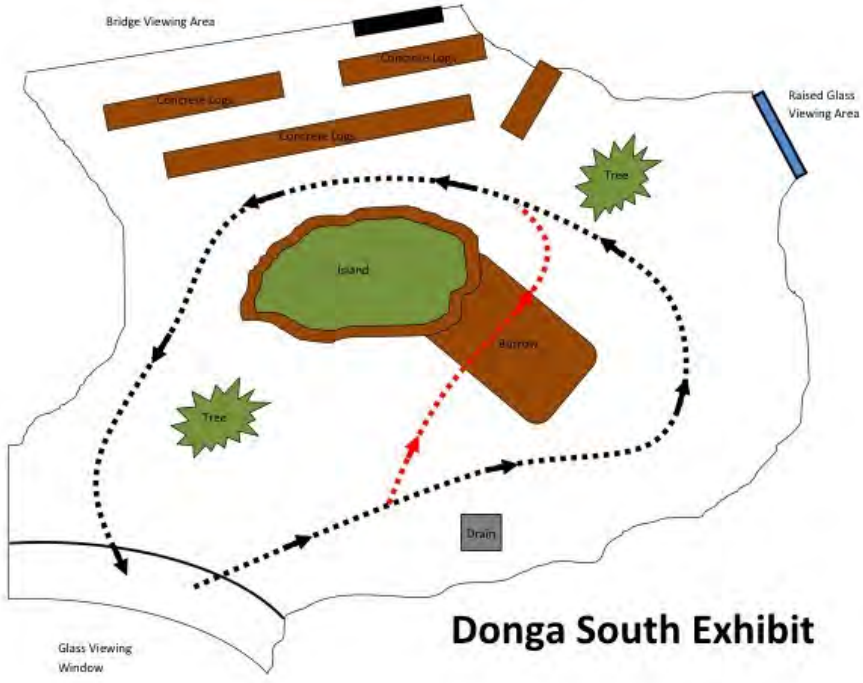


Figure 6



Training Voluntary Reproductive Assessments and Artificial Insemination with African Elephants (*Loxodonta Africana*) in a Protected Contact Environment

Maura Middleton and Michael Burns
Tampa's Lowry Park Zoo

While making great strides with the new elephant program at Tampa's Lowry Park Zoo (TLPZ), staff members have had to face numerous challenges that accompany the management and training styles adopted. Most recently, the need to perform full reproductive assessments, and the artificial insemination of the facility's 30 year-old female African elephant have been a focus of the program. This feat seemed difficult as our training philosophy no longer called for the use of tethers or restraints. With safety of staff being our main priority, along with our determination to ensure voluntary participation from all animals, we designed and utilized an Elephant Reproductive Assessment Device (ERAD) that is installed directly into our medical chute. This device allows for the veterinary staff to work under an elephant in a protected area while managing the elephant in a stress free manner during an invasive and sensitive procedure. Since development, we have utilized the ERAD for the artificial insemination of an adult who was raised in human care, as well as an exploratory scoping procedure on a full term pregnant female who was imported in 2003 as a young adult. Though the backgrounds of the individuals varied greatly, the combination of training and innovation resulted in the ability to perform the behaviors completely, with no restraints, while maintaining the safety of all staff members.

INTRODUCTION

Tampa's Lowry Park Zoo (TLPZ) has been a presence in the Tampa community since 1957. Over the years the zoo has closed, reopening in its present state in 1981. Safari Africa, the zoo's largest expansion since its reopening, was built in 2002 featuring an African elephant exhibit designed to showcase a herd made up almost entirely of individuals from the Kingdom of Swaziland. Tampa's Lowry Park Zoo collaborated with the San Diego Zoo Safari Park to import a group of 11 African elephants from the Mkhaya Game Park. All individuals were approximately 12 years of age and set to be culled as a means of population control. TLPZ was to acquire 2.2 Swazi elephants as well as an adult female from the Knoxville Zoo to create a herd.

Since 2003, TLPZ has been a protected contact facility. However, from 2003 to 2010, management and training methods varied as staff changed, resulting in limited successes over the course of those seven years.

In 2010, a new management and training program was established, striving for 100% voluntarily participation from all animals in the African elephant/rhino collection. This training completely eliminated the use of restraints and the guide. Training was instead focused on a positive reinforcement foundation and strong relationships with the animals. All animals are trained for voluntary husbandry procedures including, but not limited to blood draws, foot care, trunk washes, rectal ultrasounds, etc.

The herd is managed in as natural of an environment as possible, taking into account their natural social and reproductive needs. Individuals are only separated from the herd during yard maintenance for two hours before rejoining the group in the yards. A natural breeding program is in place for the two females that came from Swaziland. One female, Ellie, is not socially compatible with bulls, so artificial insemination was determined as the most feasible reproductive option.

ELLIE

Ellie came to TLPZ in 2003 having lived in a zoological setting for the majority of her life.

Collected in Namibia in 1982 at just 1 year old, Ellie was brought to the International Animal Exchange in Ferndale, MI. Ellie spent two years in Ferndale before moving to Baton Rouge, where she spent the following two. The Gulf Breeze Zoo acquired her in 1986, where she remained for the subsequent 12 years as the zoo's main attraction and ride animal. While living at Gulf Breeze Zoo she had no other elephant companion, living as a solitary animal until she was moved to the Knoxville Zoo on a breeding loan. During her five years at Knoxville, she was housed with three other elephants - two females and one male. She did not socialize well with the other cows and was never able to interact with the bull without tethers or in a protected area. The previous facilities managed Ellie in a free contact setting where trainers shared unrestricted space. It was not until 2003, when she moved to Tampa, that she transitioned to a protected contact environment. When she arrived she was 22 years old and had still not had a calf but was known to be cycling normally. The decision was immediately made to inseminate her so she would have her first calf before she was deemed too old, when the risk of complications increase. Dr. Thomas Hildebrandt and Dr. Franz Geortiz were contacted. In December of 2003 Ellie went through a standard artificial insemination procedure where her legs were tethered for the safety of vet staff. The insemination was successful, resulting in the birth of Tamani in October of 2005.

As soon as the new management and training program was established, staff began planning to inseminate Ellie in 2011. Meetings were held with our veterinary staff to determine exactly what the procedure would entail. Safety of all staff was of the utmost importance, so it had been suggested that Ellie be trained to accept restraints. While this was the safest option that could be thought of at the time, it did not align with the training goals of the department.

The elephant team accepted the challenge and began developing a training plan that would suit both the needs of the veterinary staff as well as the training philosophy.

THE ELEPHANT REPRODUCTIVE ASSESSMENT DEVICE

There were multiple factors that needed to be taken into account in the design of the ERAD. First and foremost, the ERAD needed to provide a safe working area for all animal care staff yet be light enough for the staff to easily install in the barn's Elephant Restraining Device (ERD).

We started with the idea of a cage that could be easily secured and removed from the ERD. The two main gates of the ERD were manufactured with upper and lower access panels. Each lower access panel on the main gate is approximately 24 inches wide and 30 inches tall. The purpose of these panels are to allow animal staff to access the lower portions of an animal's posterior or anterior. Any procedure involving the elephant's posterior could have been done solely using





these access points when paired with restraints. However, the use of restraints conflicted with the barn's training philosophy.

The ERAD was built to create a separation between the rear legs of the elephant. In order to do this, we took the measurements of Ellie's posterior. These measurements gave us a rough idea of how wide the device needed be in order to separate her legs, but is also gave us an idea of how wide we could make it and still ensure that Ellie was comfortable. The height and depth of the ERAD also came from measurements taken from Ellie's posterior. The overall dimensions of the ERAD are 32 inches high, 26 inches wide, and 28 inches deep. The depth of the ERAD was determined by the area required for personnel to work safely under the elephant.

Once the measurements were taken, we began to research the materials needed to construct the device. Due to the elephants' size and strength it was a primary concern that the materials be able to withstand great force. It was also important that the device was as light as possible while still ensuring durability. For that reason, we chose to use 2.5 inch OD steel tubing with an interior wall of one quarter inch. The steel tubing we chose to use was circular, opposed to square or rectangular, in order to eliminate any possibility of sharp corners or edges. Circular steel tubing has the highest strength-to-weight ratio, making it the ideal material to use in constructing the ERAD while keeping it relatively light at approximately 40 pounds. The horizontal supports were reinforced with steel gussets at each joint. Steel gussets are used to connect and reinforce a joint where members meet at different angles. Once the frame was constructed, it was clear that it had to be wrapped with steel mesh to protect against an elephant's swinging foot or trunk. In construction, 2 inch by 4 inch, 8 gauge steel wire mesh was welded to the exterior of the ERAD and the sharp edges were ground down.

Next, the ERAD had to be secured inside the ERD. To do this, the lower access panel of the ERD gate was modified. Two 7/16th inch nuts were welded on either side of the window. Two more 7/16th inch nuts were welded on the rear vertical supports of the ERAD. Then bolts were used to secure the ERAD to the gate. Throughout the duration of any procedure in the ERD, the gate forward of the animal is open, allowing the elephant to walk away at any point.

TRAINING STEPS

It is important to note that during the training sessions, elephants are reinforced with chopped carrots and apples. A variety of other produce items are also used such as green pepper, squash, and broccoli.



Step 1: Ellie had to be taught how to back up into the chute and become comfortable straddling the device. Ellie already knew a back up behavior, so we asked her to lean in and present her body along the hallway in front of the medical chute with her back end closest to the chute. At this point we were then able to open the door to give her access to the medical chute where the ERAD had already been secured into the back window. The trainer maintained contact with Ellie on the left side of her body.

Ellie was asked to "Back up" and when her back foot touched the ERAD, she was bridged and reinforced.

Ellie was then asked to "Back up" again and was reinforced when her closest foot (her rear left foot) was placed next to the ERAD.

A target pole was then used to touch Ellie's right rear foot to-

wards the other side of the ERAD to begin shaping the straddling behavior. We ran into some discrimination issues, as most often when her feet her targeted, it was for her rear foot presents. So Ellie was placing her rear right foot on top of the ERAD instead of to the side. We decided to adjust our strategy and just touch her right hip instead of her foot to try and align her over the center of the ERAD.

Once her right foot was slightly to the right of the ERAD we reinforced. After continuing with this a few times we were confident that she was centered.

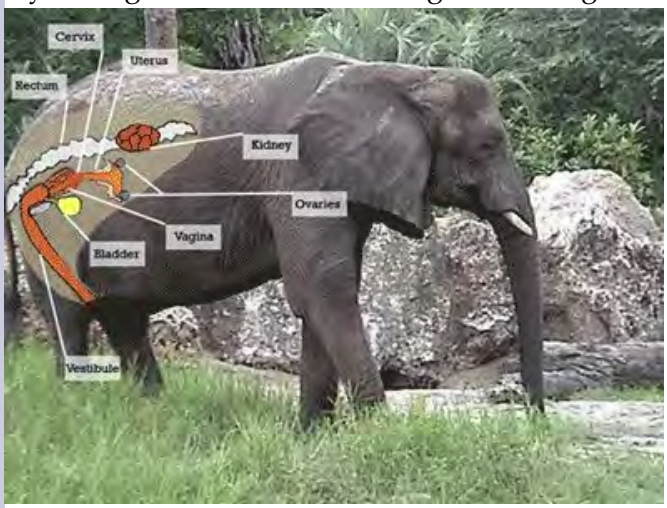
Trainers then asked her to back up one more time while both feet were lined up on either side of the ERAD. She then backed up until she was pressed up against door of the chute. She received reinforcement for this behavior, then walked her forward to set up the approximation again.

After a few approximations, Ellie was regularly straddling the device and getting into comfortable positioning.

Step 2: Once Ellie was regularly straddling the device, it was necessary to be able to have her tail held out of the way, so we added a second trainer to not only start desensitizing her to people being behind her, but to also start her tail manipulation. When Ellie straddled the device, the second trainer would reach in and touch her tail. She was reinforced for allowing the trainer to guide her tail through the window.

Step 3: We began desensitizing Ellie to general tactile around her genital area. She showed very little reaction to this step so we moved on to introducing the tubes.

Step 4: The veterinary staff were using a 22 inch endotracheal tube to allow the scope to move easily through the vestibule. We began inserting the tube one inch and reinforcing when it was removed. During each approximation, the amount of tube that was inserted increased by an inch or two depending on Ellie's response. If she showed any signs of discomfort we would move back to the previous depth.



Step 5: After the tube was completely inserted, the endoscope was then introduced. This is a 3 meter scope that would move past the end of the tube into the vestibule and make the turn to the vagina, and eventually the cervix. As when training her to allow the tube to be inserted, she was reinforced after we approximated the scope just inches at a time.

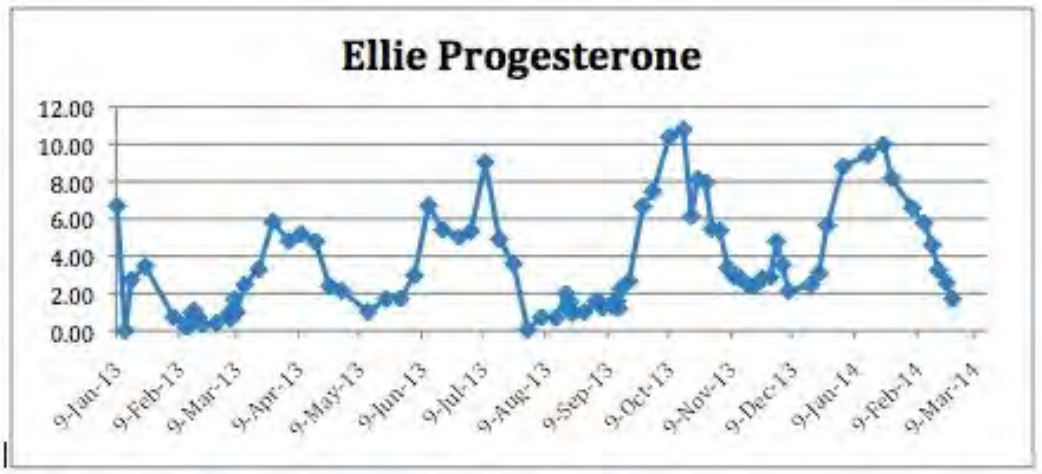
Once the scope was completely inserted we were ready to attempt the insemination during her next cycle.

TRACKING ELLIE'S CYCLE

An elephant's ovarian cycle is approximately 15 to 16 weeks, made up of an 8 to 11 week luteal phase and a shorter interluteal phase of 4 to 6 weeks (Olson, 2004). In that interluteal period, there are two luteinizing hormone peaks (Kapustin et al., 1996). The first surge is observed between 12 and 21 days (Kapustin et al., 1996), with the second surge occurring 19 to 22 days later,

which induces ovulation (Olson, 2004).

Ellie has had a regular cycle since being at TLPZ and on average will cycle every 96 days. Staff has closely monitored her cycle through weekly blood samples, followed by daily bloods when approaching her second LH surge to determine the exact day. Fortunately, several donor facilities are lined up for semen collections and are notified of Ellie's cycle so they are prepared for their procedures.



ARTIFICIAL INSEMINATION PROCEDURE

On March 8, 2013 the zoo received a 3 mL semen sample from our own bull elephant, Sdudla, to use for the insemination process. The sample was diluted with Hepes, to make a 12 mL sample. Ellie backed into the chute and straddled the ERAD to begin the procedure. At various times during the procedure, the scope turned on itself when attempting to advance it through the vagina to reach the cervix. Due to these complications, the team made three separate attempts at the insemination. After the first two attempts, Ellie was given the opportunity to leave the chute and walk around in the barn before setting up for the next attempt. She was inseminated during the third procedure after a combined total of 90 minutes for her three consecutive sessions. Unfortunately, this procedure did not result in a pregnancy. Ellie has continued to cycle regularly since the procedure. However, to date, there has not been another insemination opportunity because the zoo has not been able to receive a viable sample. The procedure is practiced regularly to maintain the behavior for her next cycle.



MBALI

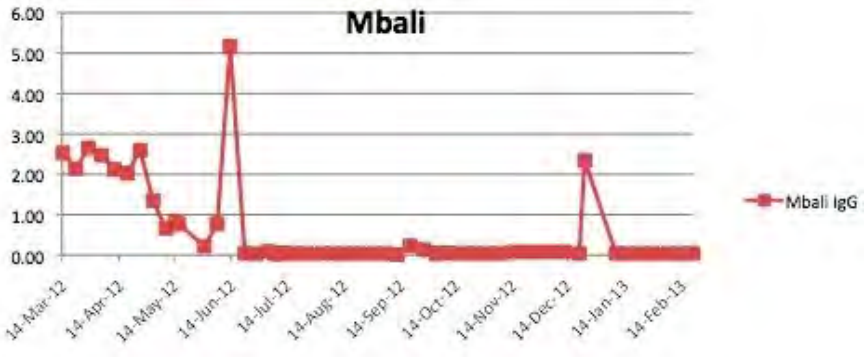
Mbali is our youngest and smallest adult female at 22 years old, 5900 pounds. Imported from Swaziland in 2003, she was 12 years old and had not previously reproduced while in her herd. For the majority of the time spent at Lowry Park Zoo, Mbali was the most submissive animal and generally needed more time to adjust in new scenarios and with new people. It was clear when introduced to this new program that she would need to build strong relationships with the training staff.

She had been breeding with both males that spent time in Tampa but it was not until 2010 that she conceived her first calf. Staff had not been collecting blood samples from Mbali before she

conceived, so there was not a concrete date that we were expecting a calf. The team had calculated a due date around October of 2012 based on breeding behavior that had been observed. However, the bull, Sdudla, is considered a "recreational breeder", so he was seen mounting her even though she was not cycling, making it difficult to narrow down a due date.

The average gestation for an elephant is 659 days with a range of 612 to 699 days (Olson, 2004). When an elephant becomes pregnant, her progesterone levels steadily increase and do not drop to baseline until the cow is within 1 to 13 days from parturition (Olson, 2004).

While closely monitoring Mbali's hormone levels, in June 2012 we were notified that her progesterone had dropped to baseline and that we should expect a calf any day. We began 24 hour watches as we prepared for labor. Days came and went with no change in Mbali and after 2 months of observations with no calf, the decision was made to discontinue 24 hour watches but to continue closely monitoring her hormones, which remained at baseline. As our original October due date passed, the zoo's veterinarian requested we train her for an exploratory scoping procedure to see if it would be able to observe any abnormalities with the cervix and birth canal.



TRAINING STEPS

Due to the fact that this procedure was needed to potentially evaluate the status of her pregnancy, we wanted to train this behavior as quickly as Mbali would allow. During her pregnancy, she had developed a rather large edema in her genital region that occasionally would develop sores if she rubbed on logs in the yard. Due to the edema and recognizing her history of needing more time to acclimate to new stimulus, the team knew she could be more sensitive to the procedure than Ellie had been. Trainers followed the same training steps that had been used for Ellie (see above training outline) but with just a couple of additions. Staff began her training by bringing her into the chute head first, to see the ERAD and touch it, so that she knew it was there when she was asked to back in. This eventually would be something that would occur before every session so she was never surprised when backing in. Trainers also spent more time desensitizing her to tactile in her genital region because of the edema. She took a few days to get used to the veterinary staff touching her edema, but after that she did not show any sensitivity to the tube or scope insertions. Staff would do numerous sessions a day with Mbali and after two short weeks were ready for the procedure. The scoping procedure lasted approximately 20 minutes, with Mbali remaining at station. During the procedure, staff observed the condition of the vestibule and reached the cervix. The procedure showed that Mbali was in good condition and that nothing was out of the ordinary. It was determined that staff



would continue to monitor hormone levels and treat her edema sores as needed. She remained in good health and condition throughout the remainder of her pregnancy and on December 23rd 2012 Mbali gave birth to a healthy female calf named Mpumi.

CONCLUSIONS

By focusing on building strong relationships with each animal, the team successfully trained semi-invasive medical procedures with two individuals with significantly different histories. The success of the progressive training approach was in its ability to provide animals with a choice while focusing on staff safety.



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Photos courtesy of Dave Parkinson, Tampa's Lowry Park Zoo

Utilizing Operant Conditioning and Passive Restraint to Identify and Treat a Fungal Infection in an Atlantic Bottlenose Dolphin (Tursiops truncatus)

Lisa Mignogna*, Michael Hunt, Billy Hurley, Tonya Clauss DVM,
& Gregory D. Bossart VMD
Georgia State Aquarium

Voluntary diagnostic samples are collected quarterly on the population of dolphins (Tursiops truncatus) at Georgia Aquarium. In October 2011, results from a routine blowhole sample revealed fungal hyphae and a positive fungal culture with the identification of Cunninghamella bertholletiae on "Makana", a male Tursiops truncatus. Through the application of systematic desensitization, the animal training and veterinary teams worked together to implement a rigorous diagnostic and treatment plan for this fungus.

This presentation will highlight how operant conditioning and positive reinforcement has led to the success of a voluntary treatment plan for Makana. Throughout this process, Makana was conditioned to receive a nasal sinus cavity flush, passive restraint for radiographs, the administration of nebulized medication via a 'steering wheel' chamber, and a full, computed tomography (CT) scan of his melon, thorax, and partial abdomen to determine the extent of the infection.

Manding, a Case Study of Giraffe Exhibiting Novel Learned Behavior

Lisa Clifton-Bumpass
A Step Beyond

Giraffe living in captivity are undergoing extensive training to better their lives, reduce the stress and the intrusion of daily husbandry care, and increase their long-term welfare through mental stimulation and enrichment. As giraffe live longer, caring for the normal age-related health issues, chronic health problems, and specific geriatric needs require husbandry staff to develop strategies creating responsive cooperative care protocols.

Exotic and domestic animals are being taught many new kinds of behaviors via Applied Behavior Analysis (ABA), the arm of psychology focused on the observable relationship between behavior and the environment. In 1957, B.F. Skinner classified a group of behavioral signals from non-verbal individuals who used signals to communicate a specific need for remedy of an internal aversive state that they could not change without the help of another. This is referred to as a mand. The mand is the result of operant conditioning whereby the learner uses what it has learned to signal the need for relief.

We will examine the training of two giraffes living in different holding facilities that independently developed a signal expressing a need for specific husbandry protocols to alleviate their physical discomfort. Both individuals learned to use an aspect of their training as a signal for specific treatments that are designed to bring relief. "Tiki", a 25 year old female giraffe at the Oakland Zoo, and "Rosie", a 4 year old female giraffe at Six Flags Discovery Kingdom, developed these operant class signal behaviors which are directly related to their training history.

Ante Up! The Influence of Antecedents in Training

Andy Hall, MBA, CPBT-KA
AvianWise

The specific environmental situation in which a behavior occurs is often overlooked as an integral part of training and behavior modification. These antecedents are often given a back seat to the influence of the consequences following the behavior, but they are advised as the first place to begin in effective and ethically grounded training strategies. Often antecedent arrangement can lead to a less coercive training strategy and allow positive reinforcement to replace punishment. This paper will explore the influence antecedents have on desirable and undesirable behaviors, their impact on the value and success of the resulting consequences, and how identification, description, and rearrangement of antecedents can be used to successfully change behavior.

Everyone can recognize a hanging green, red and yellow light signal above the street and know what it means. It is a cue to stop, go or prepare to stop. But how many times have you gone through an intersection and later thought, "Was that light green?" While the traffic light is designed to be the critical cue for behavior at an intersection, most would use many other environmental cues, stimuli, to decide whether to proceed on through or stop. Are there other cars driving through? Are the cars on the cross street stopped? What did the last traffic light tell you? These are not usually a rational conscious decision made, but a result of countless repetitions of experiences with near similar environmental cues. These stimuli that guide behavior are known as antecedents, and they are not actually triggers for behaviors, but rather collective information the mind and body use to make behavior decisions. Most often without the conscious mind understanding what is happening.

As bird trainers for shows, pets, zoos, rehabilitation facilities, and in research, issues with inconsistent behavior or undesirable behaviors performed are observed. In working with people and their birds I have heard things such as, "He knows how to step up. He does it in his cage, but not from his play gym", or a frustrated owner whose bird works for one person, but not another. It is likely to have observed a reduction in the reliability of behaviors, or performing a totally different behavior when another was expected. Unexpected fly-offs, biting, aggression and other undesirable behaviors often occur when what was thought that the conditions were right for another behavior. Other times a new situation is presented and it is unknown what to expect from the birds.

Most of the time people jump straight for the reinforcements and punishments for an explanation as to why the behavior is occurring or to fix the behavior issues. Is there another way to reinforce a desirable behavior or punish the one occurring? While behaviors are a function of their consequences, the full functional unit involves the antecedent as well which provides the desirable conditions for a behavior to occur. Antecedents also affect the value of the consequences that follow the behavior.

That Functional Unit of Behavior

Behavior does not occur in a vacuum. I have heard this statement many times, and it doesn't hurt to repeat it. But it took a while to understand what the statement meant. Because behavior is a response, or an adaptation, to all the stimuli in the environment, never isolate the behavior without considering the environment in which it occurs. A common definition of be-

havior is "Anything a person [or animal] does that can be observed". An expanded definition that removes the vacuum concept is "Anything an animal does under certain conditions that can be observed and measured". Some may feel that this definition is splitting hairs, but it is used to reinforce the notion that a behavior is a response and function of the environment.

Consequences are the stimuli that occur after a behavior and too often receive most of the attention from trainers. There are reinforcers and punishers and different operational classifications (positive and negative) as well as being primary and secondary. Consequences also provide different value to the animal which can be influenced by the nature of the consequence. But often the experiences of the bird (its learning history) influences how reinforcing or punishing a consequence is. Have they had much recent exposure to the consequence? Are there competing consequences? Is there some over-whelming presence close by that prevents the bird from valuing the consequence?

Behavior is a function of its consequences, but those consequences are heavily influenced and sometimes somewhat dictated by the antecedents. Poorly designed or executed antecedents often lead trainers down a path to an overuse of punishment and negative reinforcement. And choices in antecedents will greatly influence how valued a consequence is and how motivated the animal is to achieve it. Finally, experience or learning history from consequences becomes a large part of the antecedents.

Why Behave?

Antecedents are the stimuli that occur before a behavior. They set-up the conditions for the behavior to occur as well as provide information to an animal as to ***which*** behavior should occur. A behavior will occur regardless of what the intended behavior was. Perhaps, trainers get in a black and white mode of training and behavior analysis. When asked, the animal X (through our antecedents) and expected Y. Then, either Y occurs or not. But, when considered that instead of Y the bird performed Z, there is a tendancy to look more towards what information was given to perform Z. This diverts the attention from how to reinforce Y more or perhaps punish Z. Perhaps Z was an abstract approximation to Y. While it is completely definitional, it is never repetitive to state that the antecedents lead to behavior Z. Even though behavior is a function of its consequences, if the antecedents "say" to do behavior Z, then Z it is.

Science & Ethics Support the Importance of Antecedents

The field of science which provides much of the useful support for effective training, Applied Behavior Analysis, fortunately also provides studies to support an ethical consideration to the strategies chosen. In fact, on the human side of ABA there are federal laws guiding the use of an ethical hierarchy for strategy selection in behavior modification. Susan Friedman, PhD. has expanded on a hierarchy for professionals, developed by Alberto & Troutman in 1999 , based on the intrusiveness and social acceptance of the procedure. It is very important to point out that antecedent arrangements (both distant and immediate) are at the first level for consideration. Arranging the environment differently or identifying and fixing a natural barrier to a behavior is much less intrusive and usually more effective than continuing on and hoping a new reinforcer or punisher will be more persuasive.

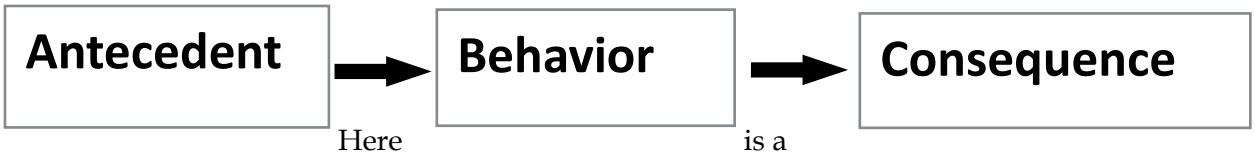
Figure 1: Ethical Hierarchy of Behavioral Procedures - Friedman, SG. (2008)

Level 1: **Distant Antecedents** - address medical, nutritional, and physical environment variables. Example: Resolve feather picking by surgically removing ingested metal, improving diet, adding natural branches and paper items to cage, and increasing opportunities for stimulating activities and exercise.
Level 2: **Immediate Antecedents** - redesign setting events, change motivations, and add or remove discriminative stimuli (cues) for the problem behavior. Example: Move play gym away from window frame to prevent chewing; provide focused 1:1 time before leaving parrot on play gym to reduce wandering; remove earrings before holding bird to reduce snatching.
Level 3: **Positive Reinforcement** - contingently deliver a consequence to increase the probability that the right behavior will occur, which is more reinforcing than the problem behavior. Example: When caregiver says "Crate!"(A), if the parrot walks into the crate (B), then the caregiver praises and gives a treat (C). Going into crate will likely increase.
Level 4: **Differential Reinforcement of Alternative Behavior** - reinforce an acceptable replacement behavior and remove the maintaining reinforcer for the problem behavior. Example: When caregiver walks in the room (A) if the bird keeps two feet on perch (B) then the caregiver praises and offers a head rub. When the caregiver walks in the room (A), if the bird frantically rocks back and forth (B), then the caregiver ignores the bird. Keeping both feet on the perch will likely increase and rocking will likely decrease.
Level 5 (no sequential order of intrusiveness intended): **a. Negative Punishment** - contingently withdraw a positive reinforcer to reduce the probability that the problem behavior will occur. Example: As caregiver installs seed cup (A), if parrot bites cage bars (B), then the caregiver removes seed cup for 5 seconds (C). Biting cage bars will likely decrease. **b. Negative Reinforcement** - contingently withdraw an aversive antecedent stimulus to increase the probability that the right behavior will occur. Example: When caregiver offers hand, holding a towel with other hand (A), if the parrot steps up (B), then the towel is removed (C). Stepping up will likely increase. **c. Extinction** - permanently remove the maintaining reinforcer to suppress the behavior or reduce it to baseline levels. Example: Enlist children's help to ignore the parrot's attention-maintained swear words. Swear words will likely decrease.
Level 6: **Positive Punishment** - contingently deliver an aversive consequence to reduce the probability that the problem behavior will occur. Example: As caregiver passes through doorway with bird on hand (A), if the parrot bites (B), then the caregiver shakes hand sharply dropping the bird on the floor (C). Biting will likely decrease.

Some may be familiar with a functional analysis to assist and guide analyzing behavior and develop training plans. The basic analysis appears in Fig. 2 and the observer fills in the antecedent stimulus, resulting behavior and the consequence stimulus. This is an invaluable tool to break down a behavior and the environmental stimuli affecting it. Most often the use of functional analysis (FA), especially when learning about behavior and training, helps to distinguish between the various consequences. It can also be used to 'chart' out the antecedents. But often when with initial use of the FA, focus tends to be on one or two antecedents, the stimuli that trainers feel are the most influential. Often these are the cues or discriminative stimulus that are expected to be the

most important. While these few stimuli may be important, there are likely many other antecedent stimuli acting on the animal to perform the behavior.

Figure 2 - Functional Analysis



Here is a simple example of a useful FA

A: Hand in front of bird
B: Bird steps up on hand
C: Offer bird a sunflower seed

This FA is a great place to start. We know several things from this exercise. The antecedent did lead to a desired behavior (hopefully) and the intent is for the sunflower seed to be a positive reinforcer and maintain this behavior. But what if the next repetition is observed as such:

A: Hand in front of bird
B: Bird takes a step away from hand
C: ?????

I left the consequence blank for a reason. Look at the consequence and decide how to punish the behavior (time-out from reinforcement) or how to raise the value of reinforcer the next time. The former strategy is already working the way down the ethics hierarchy in negative or even positive punishment. Trainers can easily stay in the top part of the hierarchy by using the latter strategy (which would technically be an antecedent arrangement by using a food lure) and improve upon it more by expanding the observations of the antecedents and looking how to rearrange those stimuli to get the desired behavior.

The above examples of a FA are very simple and useful for understanding concepts and principles, and a great approximation in using a FA to develop training plans. But to really use the FA successfully, an expansion of observations and descriptions of all three components, especially the antecedents is needed. Just as behavior does not occur in a vacuum, no behavior is so generalized that it will occur at any time, in any environment, under one discriminative stimulus (cue). So there are always multiple (if not infinite) stimuli working on one behavior. When expanding observations of antecedents take into consideration the following factors to describe the stimuli:

Temporal (time of day, night, season, year, age of bird)
Proximity - of you, another trainer, the cage sides, food, perches, dog, stranger, vehicle, other birds
Rate - of movement, since last repetition
Weather
Schedules - sleeping, exercising, foraging, mating, feeding, cleaning
Learning History - past experiences, both recent and distant
Health - overall appearance, recent changes (however slight)
Satiation level of chosen reinforcers and punishers

All of these areas are important to consider to evaluate the likelihood of a behavior occurring, and there may be many other factors not listed that are helpful to consider. This expanded observation can apply to our previous example.

A: Hand is in front of bird
Hand is completely open, palm up
Wrist is bent to create an near right angle of arm and hand
Top of hand is positioned one inch above bird's current perch and two inches in front of perch
Trainer's body is positioned at an angle from the arm, not in direct line with bird's front
Arm and hand are very steady and do not move while cue or prompts are presented
Rate of hand approach is 3 inches per second or slow and deliberate (OK, maybe not this detailed, but realize that this is often a very critical component)
Trainer has sunflower seed between thumb and finger in other hand, which is held at beak height about one foot in front of bird
No other animals are in the room and cannot be heard from this room.
Cage door is open all the way and locked into place so as not to move accidentally
Cage sides, perches, toys and bowls are out of wing and tail distance from the bird
It is 2:30 pm - about the time bird usually comes out for time on the play gym
It is November 14th and the weather has been warm all week with same in the forecast
Bird was provided water and pellets in the morning, of which half are gone.
The afternoon sun is coming through the window and hitting the play gym

These antecedent stimuli were created to be a generally successful set-up. Typically, I don't sit and write down all of these descriptions every time I train. All of these factors are going through my head during training. Most highly successful trainers have a high awareness of the countless antecedents occurring and affecting behavior.

Most of the issues presented with when working with trainers and pet owners and their birds can be improved upon just by following some of these examples in approaching birds. Simply slowing down the approach, offering a steady hand and reducing distractions greatly improve the likelihood of a bird stepping up. Making sure there is enough room for the body of the bird (especially the tail) to come out without banging into a cage side, toy, or perch are also success factors. Failure to be aware of this space may lead to unintended consequences that are often unobserved by the trainer. A slight bang of the tail on the perch may be enough of an aversive to decrease the motivation for the reinforcer over time. This is where learning history is so important to the value of the consequences.

Rearranging Antecedents

If the frequency of a desired behavior is decreasing or training one is not progressing, take a broader look at the environment and see if changing a stimulus in one of the previous factors would be beneficial. As a more scientifically oriented person, I prefer to change one thing at a time (assuming I have the advantage of time and patience to do so) and see how that affects the behavior. But when there are several factors that can be improved upon with a client, then multiple changes are asked for, but not too many to over-whelm the person and reduce their learning.

When behaviors seem to break down or undesirable behaviors are presented in the presence of certain antecedents, then use the above factors to gradually introduce the antecedents in a way that does not encourage the behavior. This is where the biggest influence on the reduction of punishment can be made. Many of the trainers who claim they need to use positive punishment are accurate in their assessment. When you keep offering a high level (rate, intensity, proximity) of

an antecedent that prompts an unwanted behavior, you are likely to get that behavior. A trainer really has little ability to use positive reinforcement at that point. A successful trainer will recognize the offending antecedent and arrange things so that it does not prompt the behavior and use deferential reinforcement (DR) of an alternative, incompatible or other behavior to replace the undesired behavior. My steps usually follow this pattern.

Identify the offending antecedent through a bit of trial and error - compare when the behavior occurs and when it doesn't, then remove stimulus and try again. There may be several associated stimuli, especially the longer a behavior has been occurring (think about the traffic light).
Remove the stimulus and work on DR of replacement behaviors.
Gradually introduce the stimulus in proximity, intensity, or rate - try to keep it gradual enough to not get the undesired behavior - this does take some trial and error
Use DR during the gradual reintroduction of the stimulus.

I have written about using this strategy in manning raptors in a less intrusive manner than traditional methods, and it is one of the most constant approaches I use for most of my behavior and training work. This is how a trainer can reduce the use of punishment, force or coercion, and intrusive training methods when replacing undesirable behaviors with desirable ones.

Other Strategies to Use Antecedents to Get Desired Behaviors

Motivating Operations

One of the most discussed and controversial forms of changing the motivation for food reinforcers is by weight management. This is a motivating operation which is technically an antecedent. By restricting access to food prior to training, motivation for food as a reinforcer and prompt (lure) is created. And in the opposite way, the more we feed the bird, the less motivated they are as they become satiated.

There are many ways in which motivating operations are used to increase and decrease the motivation for a consequence. It might be important to satiate a bird to an extent to decrease the motivation if the bird is showing too much food begging or extreme hunger behaviors. This is key if a parrot is very quick to grab food and may be showing a bit of aggression in doing so or when teaching a raptor to gently take food from fingers without footing or biting.

Food is not the only stimulus that can be manipulated in motivating operations. A parrot may be overly excited upon your return home and be unresponsive to your behavior requests until they have had some time with you. You are satiating their desire for proximity or attention. Once this is satiated, they may work for other reinforcers. Flip it around and use that hiatus to increase their motivation to work with you as long as they are not too excited by your presence to pay attention. Also be aware of the motivational power of the sun, a few birds enjoyed sunbathing outside after a period of being indoors. If they were asked to perform their show routines before they had a chance to fully soak up the sun and warm up, they would usually respond by sitting with wings and feathers out and a gleeful, relaxed look in their eye. They needed time to satiate on the sun (warm up) before they would be motivated by anything else. Restricting an animal's access to something that stimulates a fixed action pattern can also be used to capture behaviors on cue. Introducing a seriema or ostrich to a previously restricted sand box will likely get a dust bath behavior.

While these are powerful antecedent arrangements, caution should always be taken not to restrict or satiate any resource to the point of getting extreme behaviors or health issues. Also be aware of competing motivations and look for the balance between them. Too much food re-

striction to overcome the need to take a sunbath or explore novel objects is not an ethical training strategy.

Jump Starting Behaviors

Asking for a high-probability behavior before asking for a low-probability behavior has been referred to as jump starting a behavior. When the request for a new or weakly maintained behavior has either failed or are doubtful of the success, asking for a high-probability behavior (one that they know well and perform fluently) increases the chance that the low-probability behavior will occur. It doesn't need to be a related behavior, just something to get them on the training track.

If working on a weakly performed behavior of dropping a bead into a bowl (a low-probability behavior), but today have had two failed attempts, the session can start by asking the bird to run over to the other side of the table and touch a target (a high-probability behavior). By asking this and then reinforcing it as usual, they may be more motivated to try another behavior.

Offer a Choice and the Ability to Escape

In working with children (and most grownups) there is a significant improvement on behavior compliance if the person is given a choice in performing a behavior or how to do it. It is an extremely powerful motivator in management, marketing, teaching and child rearing. Dr. Alan Kazdin of the Yale Parenting Center has shown through his research and work that by simply starting your request (cue) with the word "Please" and doing so in a non-threatening and pleasant voice, the compliance probability is greatly increased. Now, I do not know of any birds where simply saying please will help out, but by doing so, we set our own antecedent to ask in a more pleasant and non-threatening manner that may improve behavior compliance.

Even without the benefit of understanding pleasant language, there is a great deal of opportunity to provide choices to the birds in training. And when they realize they have these choices they begin to learn behaviors more quickly and are more reliable later on.

Years ago, I was training a young rook named 'Horton' for my show. Being a corvid, I wanted to challenge my training; see how she could learn and respect the corvid nature of being anxious and fearful when forcefully trained. I decided to crate train her with free shaping and use little to no prompts (no target or food lures). I sat in my yard about two meters in front of the crate and had a bowl full of treats. I did not move from my spot the entire training session. It only took 30 minutes before she was entering the crate and standing in it for 5-10 seconds. It was one of the quickest crate training sessions I had ever experienced and she was more reliable with it than any bird I had ever worked with. I then wanted to see if a parrot could do as well. My ring-necked parrot took two 15 minute sessions to do the same thing. But maybe it was an intelligent bird thing. So I attempted to do the same thing with a chicken who was afraid of approaching a person. Not only did she begin eating food from my hand in the training session, but it only took her 15 minutes to be comfortable enough in the crate to close the door and pick it up. This chicken had spent this first month running 10 feet away and even bashing into the back aviary wall when I fed and watered them.

I thought a lot over the years about why free shaping like this seems to work so well. My current thought is that free-shaping, without any prompts to distract or change the motivation, offers such a wide range of choice that the fear factor is greatly diminished and learning is improved.

In the previously mentioned paper on manning raptors, I discuss fear and stress and how escape from these is an important (possibly imperative) choice for our birds to have to promote successful learning and training. When a bird learns that they have a choice of whether to partici-

pate or escape from a stimulus (either by their own actions or by ours in response to their behavior) they gain control and are more willing and motivated to participate in the learning in the future.

In our behavior functional unit of Antecedent - Behavior - Consequence, all three components are critical and supply information to the animal in order for learning to occur. Consequences give function to the behavior. Antecedents provide not only information on what behaviors should occur, but also affect the likelihood they will occur by influencing the motivation to do such behaviors and the value of the expected consequences. There is no argument that consequences are vital and they should be observed, analyzed, evaluated and tested in the same manner (much too often most of the stimuli occurring after a behavior are ignored as well). I hope I created more appreciation for the power and influence antecedents have on the behavior and consequences. The best and most successful trainers, managers, marketers, teachers and parents seem to have a great understanding and ability to observe, identify, and arrange antecedents to not only get the behaviors they desire, but have willing and happy participants working with them.

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Exploring Reptile Training at the Smithsonian National Zoological Park

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The animal keepers at the Smithsonian's National Zoo's Reptile Discovery Center (RDC) employ all types of training techniques with every Order of reptile housed at RDC. In the past decade veteran keepers have been slowly conditioning animals to perform specific behaviors to facilitate captive husbandry. These keepers are inadvertently or unintentionally training their animals, often not employing by-the-book techniques. Standardized training protocols often discourage cognitive training efforts by keepers who feel that these protocols are too focused on procedure, rather than an animal's natural history and behavioral response. Although these training techniques differ from the methods of operant conditioning typically taught to animal care professionals, the results are just as amazing and beneficial. Recently, RDC staff have been utilizing all types of training to further explore reptile cognition. This has led to some interesting findings including, the social hierarchy of three false water cobras, Hydrodynastes gigas, and reverse learning in green tree monitors, Varanus prasinus. Additionally, a recent publication on skilled forelimb movements in black tree monitors, Varanus beccarii (Mendyk and Horn, 2011), led RDC keepers to explore this type of cognitive behavior in green tree monitors, Varanus prasinus, Mertens' water monitors, Varanus mertensi, and Komodo dragons, Varanus komodoensis. Furthermore, by experimenting with water levels and live prey, keepers have observed V. mertensi corralling fish with their bodies and tails. This is just one example of many amazing behaviors keepers observed. Presenting our experiences with reptile training and cognition will hopefully inspire others to train their reptiles, which is beneficial for routine husbandry and veterinary care.

The London Zoo was founded in 1828 and opened the first zoological building dedicated to reptiles in 1849 (Murphy, 2007). At this time physical restraint was often a common practice with all taxa, including reptiles (Fowler, 1978). Over time, with an increased knowledge of species' natural history and behavior, animal husbandry practices have evolved to include methods that are less stressful. These methods further evolved when operant and classical conditioning techniques were made more accessible to zoological professionals through several publications (Pryor, 1984; Ramirez, 1999). These procedures often include training regimes that are based on an animal's cognitive abilities. Studies on behavioral complexity in reptiles are limited when compared to the research conducted on mammals and bird species (Burghardt, 2013) and this is often reflected in their management. Historically, reptiles have been neglected in terms of research involving their cognitive abilities, and thus standards for enriching captive reptiles have been lacking. Research has demonstrated behavior complexity and the ability to learn in reptiles (Augustine, 2009, 2010; Bustard, 1968; Burghardt, 1977; Burghardt and Layne, 1995; Gaalema and Benboe, 2008; Gerrits and Augustine, 2013; Hellmuth and Gerrits, 2008; Murphy, 2014; Vause and Jones, 2009; Weiss and Wilson, 2003), and in the last decade these discoveries are being reflected in the management of zoo collections.

When designing husbandry or training programs for a reptilian species, it is important to consider the mode of communication each species uses (Hellmuth et al., 2012). In general reptiles utilize visual, acoustic, tactile and chemical communication and often rely on a combination of multiple methods (Vitt and Caldwell, 2009). Reptiles are a diverse group of organisms that require varied training approaches. At the Smithsonian National Zoological Park (NZP) keepers

in the Reptile Discovery Center (RDC) employ multiple techniques to manage their diverse reptile collection. Standard operant conditioning is often included as the benefits to captive animals and their caretakers are well documented. Although the benefits are clear, not all animal professionals utilize these regimented protocols. This is particularly true with reptiles, as training is a relatively new tool for herpetologists. Although these keepers do not use standard operant conditioning techniques, they are still slowly conditioning the animals in their care to allow for a variety of behaviors that facilitate husbandry and veterinary care. For instance, keepers at RDC often allow the reptiles to investigate them and the tools they use through tongue flicking before any contact is initiated. Additionally, they begin to desensitize them to handling by first touching the animal with a snake hook and then gradually progressing to gentle manipulations by using their hands. From a behavioral analysis perspective using the antecedent-behavior-consequence (ABC) model (Friedman, 2009), the animal, by not retreating upon approach, is setting the initial antecedent (A). The behavior (B) occurs when the keeper approaches the animal and the consequence (C) is then dictated by the animal's reaction. The consequence then becomes the antecedent for the next loop. The behavior sequence continues until the consequence changes to the animal retreating from the interaction.

Reptile husbandry has been facilitated by utilizing both operant conditioning and habituation techniques. Many species of reptile at RDC are trained to follow a target, sit at a station and voluntarily move into a crate. Most impressively, three juvenile false water cobras, *Hydrodynastes gigas*, are target trained (Gerrits and Augustine, 2013). Furthermore, many species have been acclimated to the presence of a keeper, allowing for gentle manipulations including baths, veterinary exams and nail trims. As reptile cognition is further explored through operant conditioning, this training has become a tool for keepers to conduct research. For example, keepers trained a pair of green tree monitors, *Varanus prasinus,* to enter a crate in order to facilitate feeding. This behavior was later used to move the male into a new enclosure and allow a visual discrimination study to be conducted on singly housed animals.

Additionally, by spending time observing behavior and offering enrichment, keepers have been observing behaviors not previously displayed. For example, by lowering the Mertens' water monitors, *Varanus mertensi,* water level and offering live prey, keepers were able to witness the animal corralling fish with its body and tail. This behavior has been documented before (Lee and Friedmen, 2000) but was never seen at the RDC. Lastly, by reading current literature, RDC staff are able to provide novel enrichment for several species, for example "Skilled forelimb movements and extractive foraging in the arboreal monitor lizard *Varanus beccarii* (Doria, 1874)" by Mendyk and Horn (2011). The RDC staff will continue to explore reptile training and cognition in order to facilitate captive husbandry, increase animal welfare and promote reptile conservation.

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Managing Training and Enrichment Programs: Bridging Gaps all Around the Zoo

Julie Grove
Maryland Zoo

I would like the opportunity to share with other zoo professionals the many benefits to both animal training and enrichment programs since the creation of my position at The Maryland Zoo. My position is part time and encompasses the management of all training and enrichment programs throughout the zoo. During my zoo career I have worked as a keeper and a manager in multiple animal areas. This experience has helped substantially in my current role. Communication, planning and organization are keys to successfully managing training and enrichment programs. My role involves mentoring keepers while assisting them with training zoo wide. I am also responsible for working to maintain and improve enrichment programs. I am the liaison between keepers, area managers, collection managers and veterinary staff concerning animal training and enrichment. During my tenure, many training goals have been met including voluntary injections, blood collection, and ultrasound procedures to name a few. Communication, planning and organization have played a critical role in shaping and maintaining these complex behaviors. I would also like the opportunity to discuss the benefits of working with volunteers and interns to further enhance these programs. With the help of many contributors I also created an enrichment committee and an enrichment documenting and cataloging system. My long term goal is to ensure that we continue to make progress in both programs while bridging gaps along the way that help all individuals involved become a part of future successes.

The Maryland Zoo in Baltimore is home to over 2,000 animals and is one of the oldest zoos in the country. The animal department structure has changed over the years, but currently consists of a General Curator, Assistant General Curator, Avian Collection Manager, Reptile Collection Manager, Mammal Collection Manager, Elephant Operations Manager, Operations Manager and seven Area Managers. I held one of the manager positions for several years before taking personal leave for 3 months. During my absence I received a call from my Curator to discuss a brand new position that was created for me. It was a much needed position at the zoo that also fulfilled new AZA requirements. I accepted the position and returned to the zoo as the animal training and behavior coordinator.

The first challenge was going to be finding a way to manage the training and enrichment programs while developing other aspects of the position along the way. This is a part-time position and though the basics were outlined, I was allowed a lot of flexibility to grow the position into something more. I can say with certainty that there were three crucial aspects to making this successful. Communication, planning and organization were going to be key in managing all training and enrichment programs. Communication is critical for my role at the zoo. I constantly update Area Managers with any concerns or accomplishments. I also am involved with projects throughout the zoo so my communication is necessary in all zoo departments. Animal manager meetings occur weekly and I will give updates as needed during this time.

The planning stage was the biggest challenge, but also the most important aspect to establish. I started by reviewing all training programs throughout the zoo and the processes that were in place before I made any changes. The first step was to organize all the existing program paperwork and then create new documentation to allow for easier approval and tracking. There is a form that keepers will complete when first proposing a brand new program and planning forms for every behavior in that program. I keep track of all behaviors and keepers will maintain a daily log book in their areas that will contain all such documents. There is currently a department wide document that lists all animals and the specifics of each program including behaviors, primary and secondary trainers, criteria and other important information.

Managing Training Programs:

Once the basics were in place I decided to create a plan for how I would oversee so many different programs. My daily and weekly priorities change quite often as typical in the zoo field. The organization element is what really helps ensure all programs are progressing as they should. I typically see about five or more training sessions each day I work. I prioritize based by medical needs and requests from our Veterinarian and Area Managers. The keepers are very good about contacting me as soon as there is a challenge or concern needing my assistance. I am able to help directly for some of the training and simply observe and offer support for others. I work with all new keepers before they begin training any animals. They are given certain books to read and will observe many sessions before they begin. One of the biggest challenges is getting keepers approved to train multiple animals in their charge. Monthly progress reports and routine observations help to keep programs on track.

Over time I began to realize that most of the behaviors we were training required veterinary assistance and that communication would once again be a key success. Working closely with the veterinary staff has been instrumental in many of the successes in the recent past. Historically keepers were allowed to administer routine vaccines and have attempted intramuscular injections for anesthesia. There had been complications in the past creating concern at this level of the training programs. A protocol was established stating only a member of the Veterinary staff could administer any injection including blood draws. I knew the only way to make this happen while actually achieving training goals was to include Veterinary Technicians early and often into all programs. We worked together to pair each program with a technician. It has worked amazingly well and currently the Veterinary Technicians participate in all active training programs. The amount of routine voluntary injections, blood draws, cardiac and abdominal ultrasounds has increased significantly.

There are many benefits still to come and all parties involved are eager to take on any task necessary. Although there have been many animal training successes since working with the Veterinary staff, one recent victory stands out. Our geriatric female cheetah has been diagnosed with the Feline herpes virus and would frequently have outbreaks on her face. We had been treating her with Famvir™, but did not get the results we hoped for. There wasn't much research on dosages and we knew the medication could negatively impact her liver and kidneys. We had the

mesh modified by our exhibits and maintenance department immediately to facilitate a new behavior. The Veterinary Technician assigned to her program came down every day to begin working with keepers to attempt voluntary blood collection. The training was successful and now the Veterinarians can increase her dose gradually while monitoring her liver and kidney enzymes. Blood is also collected 6 hours after the dose so they can use banked serum/plasma to run Famvir levels if they are needed in the future. This training accomplishment truly sums up the importance of teamwork and excellent communication.

Managing Enrichment Programs

I first developed and put into place a process in place for approving enrichment proposals submitted by keepers. The proposal form has been updated and is now used in all areas. The approval process is effective and allows all necessary people to review and comment on the document as needed. In addition, I maintain several binders with every approved and denied proposal for anyone to review. There is also a spreadsheet for all food and non-food items for all animals on a shared drive in addition to specific lists in each area.

Over the past few years I have worked with our Veterinarian to create food enrichment unit charts. I will choose a species and then get a daily allotment for extra calories from enrichment. I will then look up each approved food and assign a measurement that will go along with a designated unit (1 unit=25 kcal; animal can receive 125 kcal or 5 units per day; 1cup of cereal=125 kcal) allowing keepers to give a variety of foods while ensuring animals are not over fed. This is updated often and kept in the enrichment log books or hung in the designated area. I make sure to update the log books and spreadsheet as often as needed.

There is now a photo catalog documenting every non-food or toy enrichment around the zoo. This has helped streamline items while allowing keepers to know exactly what each item is for and how it is used. One of the biggest tasks is purchasing or finding the approved items for the keepers. For this, I maintain a budget and try to get as many of the requested toys and other enrichment items as possible. All the toys come directly to me so I can disperse them around the zoo.

I knew I had to find other ways to supplement the amount needed for so many enrichment items. There are companies I work with to get donations for our enrichment program. Each year I receive a large supply of fire hose, excelsior (wood wool), burlap bags, beer kegs, tractor tires and more. These items are managed by me so I can arrange additional donations if supplies are low. Giving trees decorated gift idea ornaments are placed around the zoo for volunteers and staff during the holiday season. This allows a variety of enrichment items to be purchased by zoo personnel. On average I collect over $3,000 in donations, toys and monetary gifts. I work closely with staff from our Development and Marketing departments to assist with the donations and also to organize a variety of enrichment events. We currently hold seven or more enrichment events each year and these events are hugely successful for the zoo.

This is only possible because of my Volunteer Enrichment Team. For years I have managed an amazing team of volunteers who solely assist with any enrichment need assigned. This team meets once a month and focuses primarily on making paper mache themed for the big enrichment

events. They make paper mache pumpkins for a Halloween event and paper mache eggs for an Easter event just to name a few. We meet in the beginning of the year to go over the final event dates so they can prioritize the tasks needed at each workshop. There are a few months in between events so they can focus on making fire hose hammocks, PVC puzzle feeders, ice treats and more. They are instrumental in many enrichment successes and again planning, communication and organization are an absolute must.

A few years ago I decided to continue my involvement with the volunteer department by accepting interns each semester. This has truly been a wonderful experience and a benefit for the zoo as well as each intern. These interns work with me in the beginning and focus on observing animals for a variety of reasons. They are also able to assist me in other projects each semester.

Managing enrichment programs wouldn't be complete without an enrichment garden. The Horticulture department works closely with the animal department in a variety of ways. I have been teaming with this skilled department to grow and plant an edible food enrichment garden each year. This garden now has signage and is a keeper favorite every spring.

In closing, there are so many more aspects of my job I would love to pursue, but I am satisfied with the accomplishments so far. Keepers will sometimes ask me about a project that seems impossible, a behavior that seems too difficult or a toy that is too expensive. I think everything is possible and that communication, planning, organization and building relationships around the zoo is the only way to make it happen.

Getting to the Heart of Fear – Counterconditioning for Future, Unknown Stimuli

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We know that we can desensitize our animals to known fearful stimuli. But can we desensitize our animals to unknown, future stimuli? Stimulus generalization occurs in a variety of learning situations, in both behavioral acquisition and systematic desensitization. For example, many species may be desensitized to their caretakers; they then extend that reduction in fear to other human staff members. Can we extend this generalization to other objects and situations?

Our goal in this study was to determine whether counterconditioning could partially insulate animals from the adverse effects of future frightening stimuli. We exposed chickens to a commercial dog toy and then used counterconditioning to eliminate their anxious response. We then exposed the birds to a new frightening stimulus, a stuffed red-tailed hawk (Buteo jamaicensis), to determine whether there was any decrease in their fear response. Both the training and testing were done in the same room, under the same conditions, to take full advantage of any contextual cues that might foster stimulus generalization.

The results of our study have direct implications for animal management. Animals that are kept in outdoor enclosures may be exposed to a broad array of potentially adverse triggers, from boisterous visitors to natural predators that are seen, heard or smelled from afar. Regularly scheduled training session can be easily modified to include counterconditioning to novel stimuli. While we can't expect to fireproof our animals from fear, we can better equip them to deal with the unknown.

Say "Baaaah"

Micaela Muniz
Fort Worth Zoo

Boer goats thrive in a stimulating environment, making them great candidates for training. At the Fort Worth Zoo in Fort Worth, Texas, we maintain 0.2 Boer goats. Keepers noticed that one goat was having difficulty eating her food. Our veterinarians discovered that her back teeth were not lining up properly as she chewed, causing uneven molar wear. The treatment prescribed was sedation and filing of the uneven surfaces, which would have to occur about every 8 weeks. In an effort to minimize the amount of times that sedation would need to occur, training both goats to open their mouths began so that their teeth could be inspected more often and some light filing of their teeth could occur. However, opening wide and holding this position is an unnatural behavior for goats. A whole apple was used to begin shaping the open mouth behavior and clear hand and verbal cues guided the process. Timing of reinforcement played a critical role in the progress. The completion of this behavior will contribute to the goats' overall health and well-being by enabling keepers and veterinarians to get a closer look at each goat's teeth without risking injury to the goat or the people involved. It will also reduce the amount of times sedation is necessary. Creating a daily schedule for teeth maintenance will also ensure early detection of any potential problems. Each goat is eager to participate in training sessions, which keeps them mentally stimulated and helps create a stronger animal-keeper bond.

Background

Boer goats are highly intelligent animals that thrive in a stimulating environment, making them great candidates for training behaviors. In the Farm and Texas Town area of *Texas Wild!* at the Fort Worth Zoo, we maintain 0.2 Boer goats, Piper and Clover. In the winter of 2013, keepers noticed that Clover was having difficulty eating and finishing her food. Our veterinarians discovered that her back teeth were not lining up properly as she chewed, causing uneven molar wear. The treatment prescribed was sedation and filing of the uneven surfaces. However, in order to maintain her teeth, this treatment would have to occur about every 8 weeks. In an effort to minimize the amount of times that sedation would need to occur, I began training both goats to open their mouths with the hope that we could inspect their teeth more often and some light filing of the teeth could occur periodically as needed.

Training Techniques

Goats are curious animals, investigating many objects with their mouth. They use their prehensile lips and tongue to browse many bushes and grasses. However, opening wide and holding this position is an unnatural behavior for them.



Both Piper and Clover are highly food motivated, so I thought I would have the most success getting them to open their mouths if I used some type of food as incentive. I began holding a whole apple, placed in between my fingers and thumb, in front of them to encourage any type of mouthing behavior on the apple. Once the goats were reliably moving toward and opening their mouths for the



apple, I started to bridge only for wide mouth opens. After about a week of training this behavior, Clover was reliably opening her mouth around the apple, allowing me to move to the next step with her. I began pulling the apple back just a little in order to encourage an open mouth without her lips touching the apple. This step took about a month, as I tried various distances with the apple before Clover was consistently opening her mouth with the apple being several inches away from her. My next step was to remove the apple and ask her to open with just an open hand and verbal "open" cue. This seemed confusing to her at first and made for some funny moments of her gesturing toward the apple with her lips. Because of this, I decided to hold the apple in the crook of my elbow with the same hand performing the visual cue. Two days of doing this was enough and on the following day of training, Clover offered the behavior before being cued and without seeing the apple. I decided to capitalize on her excitement and asked her to open with nothing but the hand and verbal cues. She was eager to open her mouth and I offered her a huge jackpot. Since this session, she has been opening her mouth on cue.



Current Status

Currently I am working on extending the amount of time that Clover will keep her mouth open so that we can inspect her teeth and I can begin introducing an object that I can use to acclimate her to having her teeth touched. I am starting with a tongue depressor and am lightly touching the side of her mouth and tongue with it when she opens and then reinforcing her for holding. Once Clover is holding her mouth open and allowing me to touch her teeth, I will move to something with a rougher surface, such as a cuttle bone or Greenie dog chew, to continue to acclimate her both to touch and a back-and-forth movement in her mouth. Once her open mouth and hold behaviors are solid, I plan to work with our veterinarians on a teeth inspection, filing protocol and maintenance schedule.



Piper has also made great progress. Currently, I am working on shaping her wide mouth open around the apple. In the past few months, she has transitioned from simply licking and pulling at the apple with her lips to opening her mouth intermittently around the apple. I am confident that both goats will be opening their mouths and holding for daily teeth maintenance in the near future.

Conclusion

The completion of this behavior will ease the dental experience and will contribute to the goats' overall health and well-being. This method will enable their keepers and veterinarians to get a closer look at each goat's teeth without risking injury to the goat or the people involved. It will also reduce the amount of times sedation is necessary, decreasing the potential risks that accompany sedation, as well as reducing recovery time from sedation procedures. Creating a daily schedule for teeth maintenance will also ensure early detection of any potential problems, increasing the likelihood of a favorable outcome. Finally, each of the goats is eager to participate in the training sessions, which keeps each mentally stimulated and helps to create a stronger animal-keeper bond overall.

Hunting for Fun- Training with the Goal to Enrich Birds of Prey

Molly Gezella
University of Minnesota

At the University of Minnesota Raptor Center, our education birds work with a wide variety of staff and volunteers. Due to the sheer number of handlers (approximately 45) who run the 1000 annual programs, it's not uncommon to see previously solid behaviors break down. In the case of our female Barn Owl, we have seen breakdowns in her glove behavior, increased aggression, difficulty stepping her out of a crate, and decreased confidence in programs. In order to accomplish the task of a having her be a successful education bird, a new training and enrichment regimen was set up. This paper will cover how we trained her to fly to the glove, respond to an audio cue, and simulate sound based hunting as an enrichment opportunity. These behaviors rebuilt her confidence with new situations, new handlers, and allowed her to be more comfortable in her environment. For me, the "heart" of behavior management is creating an environment where the animal is both physically and mentally fit. With these new training strategies, we were able to provide that for this Barn Owl. We have already seen a general increase in confidence, a decrease in nervous behavior in new environments, and calm behavior in large groups of people in familiar program rooms. Additionally, her crate behavior has improved and all handlers report less aggression from her stepping to the glove.

Using Collaboration and Creativity to Increase Exhibit Use

Matthew Lenyo
Denver Zoo

In June 2012, Denver Zoo opened Toyota Elephant Passage, an innovative 10-acre exhibit featuring animals from Southeast Asia. 1.1 White-cheeked gibbons (Nomascus leucogenys) are one of the species housed in the new exhibit. Their habitat was designed to provide a unique and interactive experience for both animals and guests. However, with the innovative design came several challenges. This paper will discuss one such challenge and the use of behavior management to help overcome it. The gibbon habitat consists of three islands, each connected by high vines. To reach the third island, the gibbons must cross a 55 foot vine that spans 20 feet above a visitor area. While the female gibbon crossed the vine herself, the male was extremely reluctant. Staff developed a training plan to help increase his exhibit use. The experience provides a unique perspective on the entire training process. The paper discusses the importance of collaboration and brainstorming to develop innovative solutions to complex problems. The behavior involved several logistical challenges and required a great deal of flexibility and novel thinking to select the most successful approach. While the behavior is still a work in progress, continuous evaluation has proven to be an important tool for moving forward. The paper concludes with a discussion of unexpected outcomes and touches on the difficult task of recognizing when a behavior is beyond the abilities of an individual animal. It explores how other tools might be paired with training to ultimately achieve the desired objective.

Introduction

Denver Zoo's Toyota Elephant Passage opened in June 2012. It consists of several animal habitats surrounded by a larger rotational exhibit. Rather than focusing on one specific taxonomic group, it showcases an entire Asian ecosystem. As guests travel through the exhibit, they are introduced to the incredible diversity of species found throughout Southeast Asia. Its unique design explores the complex relationships between humans and animals in the region and highlights many of the conservation efforts currently in place.

In addition to inspiring visitors, the exhibit was also designed to provide exceptional animal care. The habitats take into account the animals' natural history while also incorporating their varied physical, social, and mental needs. One of the species housed in the exhibit is white-cheeked gibbons. Their habitat is made up of an off-exhibit holding and three islands arranged in a triangular pattern, each connected by high, overhead vines. To travel from the building to the islands, the gibbons must cross over water. Once on the first island, they can travel to either the second or third island. However, to reach the third island, the gibbons must brachiate along a 55 foot vine that sits 20 feet above a visitor boardwalk. There are no nets, wires, or other barriers to separate the animals from the guests; only water and air. Not only does this provide an engaging experience for guests, but it also provides a large, naturalistic habitat for the gibbons. It maximizes the vertical space for the animals while minimizing the habitat's overall footprint.



Picture 1: Overhead view of the gibbon exhibit with island one in the top left, island two in the top right, and island three below them in the center (photo by Dallas Meads)

Animals on Exhibit

While the habitat proved immediately popular with guests, it presented some navigational challenges for the gibbons. When they were first given access outside, both were reluctant to cross to the first island. After a few days, a second rope was added and fruit was placed along the ropes every 3 to 5 feet. While both gibbons slowly started to venture out onto the ropes, the female gibbon, Vinh, was much more confident. After a week and a half, she made her way over to the first island. The male, Jing Chi, remained at the building. Staff hoped that Vinh would provide enough motivation for Jing to cross to the island. Unfortunately, Vinh started to bring Jing food from the island and his motivation quickly stalled. After little progress, Vinh was closed in the first two stalls of the building and Jing was left alone with access to the islands. Over the next few weeks, staff frequently set-up this scenario and continued to leave fruit along the vines. As his confidence increased, Jing slowly started to use the vines more and more. Four weeks after he was initially given access, Jing made his way out to the first island.



Picture 2: Female gibbon, Vinh, crossing to the first island from the holding building with the help of a second rope (photo by Charlotte Bassin)

After 2 days on the first island, Jing crossed to the second island with no problems. Within a short period, Vinh made her way over as well and was soon moving confidently between all three islands. After nearly 6 months, Jing had still not crossed over to the third island. In fact, none of the keeper staff or volunteers had even seen him place any support on either of the tall vines leading to island three. At this point, staff decided to develop a training plan to increase Jing's exhibit use and hopefully help him cross over to the third island.

Planning and Collaboration

Developing a training plan to increase Jing's exhibit use proved more challenging than expected. Not only did the exhibit design create navigational challenges for Jing, but it also presented a few logistical problems for staff. Some of those problems included:

- Ability to reinforce Jing for correct behaviors
- Inability for keeper staff to easily access overhead vines
- Influence of a second gibbon on exhibit during training

Our team quickly learned that this behavior would require a lot of creative thinking. The first step of the brainstorming process involved meeting with the keepers who work directly with the gibbons. Several different ideas were discussed, such as using a remote-controlled helicopter to place a target or training Vinh to drop a target at a specific location along the overhead vines. Unfortunately, none of these behaviors would actually accomplish the goal within a reasonable time frame or budget. We were also motivated to keep the behavior simple in an effort to minimize any frustration or stress on Jing.

When the team felt we had exhausted our idea bank, we decided to look to other areas for input. First, we turned to the larger Toyota Elephant Passage team. The 16-member team takes care of a variety of animals, including Asian elephants, Greater One-horned rhinos, Malayan tapirs, clouded leopards, and a variety of other small Asian species. At a team training meeting, we discussed Jing's training and the challenges we were facing. Keepers talked about similar challenges they had with their animals and some of the steps they took to overcome them. New ideas and approaches were discussed, including working on a "follow" behavior for the gibbons between the first and second islands. The team thought that having Jing follow a trainer to different stations might increase his likelihood of moving to different locations or islands.

While we thought the" follow" behavior would help, we did not think it would actually lead to our desired objective. At our initial brainstorming session, one of the gibbon keepers suggested using a laser pointer as a target. Several of the great apes at the zoo were trained this behavior, so our team decided to approach the Primate team to talk about Jing's training. We watched training sessions with both gorillas and orangutans and talked with the keepers about some of the pros and cons of using the laser target. They offered input and helped our team expand on some of the ideas we had discussed previously.

Based on the animal and the type of behavior we were hoping to train, the team determined that a laser target would likely be the most successful approach. It would allow us to place and move a target on the overhead vines with little effort. As the target moved farther from island one, so too would Jing. Over time, we hoped his confidence would increase to where he would travel the entire span on his own.

Laser Pointer Target

The behavior was initially trained inside the gibbon holding building. The laser target was first introduced directly next to Jing. He was bridged when he would look at the laser or show any interest in it. Eventually, we increased the criteria so he would have to actually touch the light

with his hand. Over several sessions, the distance was increased until Jing was moving towards the laser target. Once he was leaving the keeper to touch the target anywhere in the stall, the behavior was transferred outside.

The target was placed on the first island in an area where Jing is usually thrown food. This became his station spot for the behavior. Jing transferred the behavior outside with no problems. Keeper staff slowly moved the target up the tree (3 to 4 feet for each approximation) until Jing reached the overhead vine leading to island three. When bridged, Jing would immediately come back down to his station spot lower on the tree to be reinforced. A shade structure in his pathway caused a minor setback, as he would lose sight of the target. Because of this, we would never offer the laser target anywhere else on the island. It was always along the same path up to the top, making it easier for him to follow.

A benefit of the laser pointer target was that is helped our team address the logistical challenges that we outlined earlier. The laser allowed us to easily place a target at various points along the island, so keeper access was not as big of an issue. Keepers also had the ability to station the other gibbon, Vinh, on the third island so that she was not interfering with the training. Additionally, she was never taught to target to the laser, so this decreased her interest in the target. By introducing the laser outside at Jing's feeding spot, it also gave a clear and accessible place for keepers to offer Jing his reinforcement. He quickly learned that after he heard the bridge, he could return to his station and receive his reinforcement.

Unfortunately, our team hit a roadblock when we finally reached the overhead vine. Because of the small size of the vine and the backdrop of the sky, it was almost impossible for Jing to see the laser target once it was on the overhead vine. After consulting with our IT department about other lasers that might be more visible and learning that our options were limited, we decided to reevaluate our process.

Tennis Ball Target

With the initial success of the laser target, our staff did not want to make drastic changes to the training. The plan had been working well, except for the fact that the target was hard to see on the vine. We decided to introduce a new target in the form of a hanging tennis ball. As with the laser, Jing would need to grab onto the target when cued. The tennis ball would be very easy for him to see as it was moved along the overhead vine.

We followed the exact same training plan as with the laser target. The training began inside and then was transferred outside. To move the target higher, staff would climb the exhibit tree and set the target before the gibbons were given access to the exhibit. This process was not as ideal as the laser target because the gibbons always had to be closed inside first and staff had less flexibility with approximations. Since the target could not be moved once the gibbons were outside, each session could only accommodate a single approximation. However, since it was similar to the laser target, Jing moved extremely quickly through the process.

Once we reached the point where the target could be placed on the overhead vine, we used a cherry picker and a loop of chain to secure the tennis ball target on the vine. Since using a cherry picker everyday was not realistic, the tennis ball was left hanging on the vine and a long extension pole was used to move it back and forth.



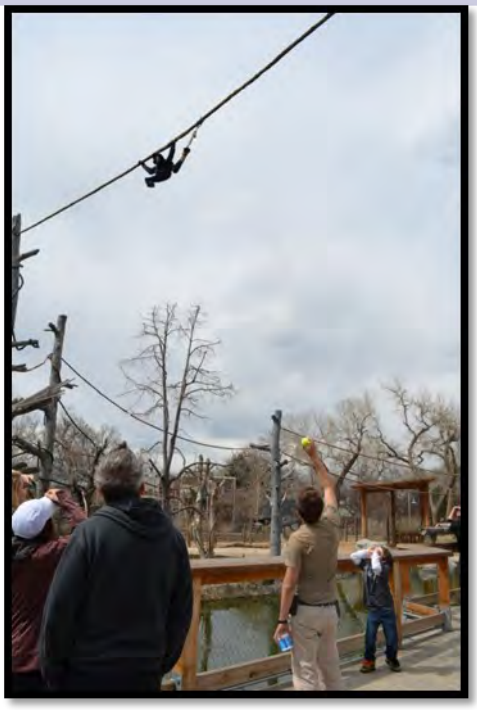


Photo 3 (left): Moving the target prior to a training session (photo by Lindsey Kirkman)
Photo 4 (right): White-cheeked gibbon, Jing, touching the target when cued (photo by Lindsey Kirkman)

As with the laser target, we continued to station Vinh on the third island. She was never taught to target to the tennis ball, so she showed little interest in the hanging target after the first day. ----As the target moved farther from the tree, Jing started to put more and more of his weight onto the overhead vine. Eventually, he stopped using the tree as an anchor point and placed his entire weight on the overhead vine. Over the next several months, he started moving farther out until he was 13 to 15 feet away from the tree on island one.

As the target got farther away, Jing would start to use all four of his limbs to hold onto the vine, rather than just his arms as he did closer to the tree. Unfortunately, once Jing reached the portion of the vine directly above the public boardwalk, his progress stopped. He would not travel any farther, regardless of the time of day or the presence of people. He seemed uncomfortable when the target was above the public pathway and would even sometimes leave the keeper during the session, completely ignoring his food.

After working with Jing for several weeks, it was clear that he had reached his limit and was not comfortable traveling any farther along the vine. While he was physically capable, it appeared that he was not mentally ready for such a feat. This was a difficult but important realization for our team. Rather than pushing Jing further, we decided to maintain his current distance and start brainstorming new ideas. We did not want to risk losing any of Jing's progress or his trust with our team.

In the future, our hope is to make some slight exhibit modifications that can be paired with the training that has already occurred. For example, the addition of a second rope might make the overhead vine easier to navigate. Pairing behavior modification with

exhibit modification is not something that we originally discussed. However, the constant brainstorming and evaluation sessions helped make this our next logical step.

Continuous Evaluation

As with all training, evaluation has proven to be an important tool for shaping this behavior. Throughout the process, our team was constantly reexamining our approach. We continuously sought input from other team members and would often ask other staff to observe our training sessions. We talked about challenges and made numerous observations of Jing's behavior during the process. This allowed us to target problems immediately and revise our plan accordingly. This helped keep progress on track and reduced unnecessary stress or frustration on Jing.

One example of the benefit of continuous evaluation involved Jing's behavior during the later stages of the training. As the tennis ball target moved farther out, we started to notice times when Jing became anxious or frustrated. He would occasionally refuse to move towards the target when cued or would leave the trainer and move to the second island. We immediately started to vary the sessions by reintroducing the laser target and introducing more "follow" behaviors. This helped us redirect Jing and reinforce him for accomplishing easier behaviors before asking him to travel along the vine again. Thanks to the constant evaluation, we addressed the problem immediately and began to notice fewer instances of frustration from Jing.

Unexpected Outcomes

While Jing has still not reached the third island, the training process has still produced several positive outcomes. First, all of the methods used during the training have given us a variety of behaviors to use for public demonstrations. The laser target and "follow" behaviors allow us to move Jing from one place to another. This provides guests with the opportunity to observe natural behaviors like brachiating and climbing. It also presented us with a great opportunity to discuss the type of training that occurs at the zoo and its importance in animal care.



Photo 5: Jing participating in a public demonstration (photo by Lindsey Kirkman)

Additionally, the behaviors helped our staff provide more mental and physical stimulation for Jing throughout the day. Before the training, the gibbons were tossed their food at a single location and the majority of their training took place inside. As the outdoor training progressed, we were able to increase the gibbons' physical activity and provide a greater degree of mental stimulation.

Even though Jing has not reached the third island, his overall exhibit use has increased. He now is frequently seen climbing on the tall vines and has shown an increase in his overall confidence.

Conclusion

While the final behavior is still a work in progress, there have been many positive outcomes from the process that should be acknowledged. These successes can be easily applied to other training challenges and can enhance the overall impact of the training itself.

In this paper, we discussed the importance of collaboration and creativity for addressing unique training challenges. With previous training plans, we sought little input from outside of our core team. The complexity of this behavior compelled us to seek advice from a variety of different sources. The external perspectives not only gave us new ideas, but they pushed us to look at the behavior in different ways. Talking about training with elephants, rhinos, and gorillas helped us build and expand on some of our initial ideas. The process also provided great professional development and networking opportunities for our staff. Several keepers outside of our work group who were involved in the brainstorming process have come by to observe Jing's training sessions.

Continuous evaluation also played a key role in the process. It established a flexible framework under which we could make adjustments to our plan quickly and with little impact to Jing's progress. New ideas were constantly being incorporated into the plan as new challenges arose. We also reincorporated some ideas that didn't work initially at later points in the training where they had a greater impact.

The evaluation process also helped us be more in tune to Jing's progress or lack thereof. When we observed setbacks, we could quickly initiate solutions. It has also helped us step back and realize that Jing, like all animals, has his own individual limitations. By evaluating his behavior and progress, we have realized that other techniques, in addition to the training, might be needed for us to reach our original goal.

Not all training plans work out like expected. However, by using the techniques we have discussed, our team was able to make adjustments, push through challenges, and brainstorm even more ideas to help us reach our final goal.

Acknowledgements

I would like to thank the entire Pavilion team for their tremendous support during this training. I would also like to thank the Toyota Elephant Passage team, the Primate team, Dale Leeds, Becca McCloskey, and Emily Insalaco for their ideas and expertise. Finally, I would like to thank Jen Hickman for all of her support and encouragement in sharing this experience with ABMA.

Jumbe, a Lesson in Patience and Hard Work

Jeremy Dillon
Cheyenne Mountain Zoo

In November of 2012, Cheyenne Mountain Zoo welcomed the black rhino back to the Mountain. "Jumbe's" arrival came after the construction of a new pachyderm building that designed to house both African Elephants and Black Rhino. In April of 2013, we started training Jumbe to make the 100 yard trek to his main exhibit. From the beginning we encountered hurdles that slowed his progress. Due to these setbacks, he even earned the nickname "The Shy Rhino". Whether it was a dive bombing Magpie, or just acclimating to the unique and different exhibit setup, our staff had to dig deep into our training tool box to create a plan that would get us to our goal of having an excellent exhibit animal for our guests to see. Through a lot of time, patience, behavioral observations, and giving control of the sessions to Jumbe we have been able to successfully exhibit a calm, confident, and amazing rhino. The days of "The Shy Rhino" are a thing of the past.

Calculating Risks, Healing Hearts: Planning and Implementing a Goal-Directed Canine Group Therapy Program for At-Risk Teens

Jody Ambrose
Train with Trust Behavior Consultants

When most people think of therapy animals, they think of friendly pets whose owners take them to "meet and greet" hospital patients as a way to brighten their day. Goal-Directed Therapy Dogs (GDTDs), however, do much more. Working directly with a health care or social service professional, a certified GDTD dog/handler team facilitates reaching a specific goal of an individual with a physical, psychological or emotional challenge.

In early 2013, I helped design a first-of-its-kind program pairing GDTD's and handlers with at-risk teens. With help from the staff of an alternative high school, social workers, and contributions from other volunteers, we designed a 6 week curriculum that teaches teens basic R+ training skills. During each weekly unit, the dog/handler/youth "triad" is challenged to work on new-to-the-kid skills. Then, together as a triad, they find ways to use their particular dog's strengths and abilities to participate in activities with the other triads. Each group activity showcases examples of social constructs such as trust, stereotypes, distractions and teamwork. Each weekly session ends with a group discussion about that topic. The relationship building which occurs among the team of dog/handler/teen, has been identified by therapists as a one of the program's greatest successes.

In just over a year, the program has grown to run concurrent day and evening programs, at capacity, three times per year. Continued improvements will include scientific data collection and a spin-off class for the teen graduates to perform community service by teaching appropriate dog interactions skills to young children.

Behavioral Training and Enrichment of Monitor Lizards

Nathan Haislip, M.S.
Fort Worth Zoo

Historically, reptilian learning capabilities have been poorly understood. However, within the past 30 years, more research has been devoted to determining the extent of their intelligence. Specifically, monitor lizards have been referred to as the primate equivalent of the reptile world with problem-solving abilities. Because these large reptilian predators can be aggressive and dangerous in a captive setting, behavioral training is an important part of maintaining these specimens in a safe and enriching environment. Utilizing their mental strengths, they can easily be trained to complete tasks that can benefit keepers and enrich the lives of the animals. At the Fort Worth Zoo in Fort Worth, Texas, we have an extensive behavioral training program that focuses on promoting interactions that are positive for both keepers and animals. An integral part of this training program includes operant conditioning using some form of target and bridge system. Through this system, we can easily shift animals, obtain regular weights, assess body condition or conduct physical exams, as well as enrich the individual animal through positive reinforcement. Other enrichment techniques are utilized including varying prey items, providing the animals with puzzles, and providing novel chemosensory items.

"Face or Foot?" Team Training a Canada Moose (*Alces alces*) for Farrier Hoof Work

Rebecca Zwicker
Cheyenne Mountain Zoo

In May of 2012 our 1.0 Canada Moose (Alces alces), Tahoma, developed a crack on his back left hoof that needed to be addressed and treated. We were asked to train Tahoma for veterinary and farrier work while he is fully alert (no sedation), on exhibit, and in a protected contact setting. To accomplish this behavior it required innovation and true teamwork as, to our knowledge and research, no other zoo facility has trained a moose for voluntary back foot farrier work. We developed the "Face or Foot" training approach, which involves two primary keepers for body placement, stationing, and mechanic work. We had to not only learn the nuances of our moose, but also each other. Whether one is working the face or the foot, there are small details that when recognized and addressed can make all the difference in a training session.

Face or foot? is how we will often start our hoof work training in the Rocky Mountain Wild (RMW) exhibit at Cheyenne Mountain Zoo with our 1.0 Canada Moose (*Alces alces*), Tahoma.

In May of 2012, Tahoma was showing lameness in his back left hoof. Keepers called him over and cued him for an established line-up behavior. We discovered a crack in the lateral hoof wall to the coronary band, approximately 1 cm from his heel. With the proximity of the crack so close to the coronary band we were concerned it would move further upwards and possibly lead to infection and long term abnormal hoof growth. The veterinary team was notified and immediately started brainstorming treatment options.

Immobilization was brought to the table, but we were hesitant to go this route given the risks involved such as bloat, regurgitation and aspiration of rumen contents when placing cervids under anesthesia. Also, there was risk of serious damage to his antlers while in velvet, and Tahoma would be an incredibly difficult animal for us to replace. For those reasons, Tahoma is in our top 10 list of animals we never want to have to immobilize. Our Zoo Director asked us to train Tahoma for veterinary and farrier work while he is fully alert (no sedation), on exhibit, and in a protected contact setting. With the help of our elephant manager, Jason Bredahl, we modeled our methodology on the protected contact methods of elephant foot work.

We developed the Face or Foot team training approach, which involves two primary keepers for body placement, stationing, and mechanical work. As an area, Jake Jachim, Kristen Cox, and I established a training plan and made it a daily priority to train Tahoma using this method. We had to not only learn the nuances of our moose, but also each other. Whether one is working the face, or the foot, there are small details that when recognized and addressed can make all the difference in a training session.

Having both trainers is critical to the successful implementation of this behavior. The Face Trainer is responsible for cueing, reinforcing and body positioning. The Foot Mechanic concentrates on the placement of the station, assisting the hoof into position when necessary, introducing new tools (rasp, pick, brush, hoof knife), and assisting the farrier or veterinary team in actual hoof work. We decided that we wanted all three primary keepers to be able to work either position. However, as we progressed further along in the training, we tended to stick with one role depending on which primary keeper we were working with. That nuance came down to comfort level and experience. Although we were cross-trained, always keeping with the original plan of, any keeper in any role, we found that sessions went better and more progress was made

with Tahoma when we were consistent.

To start, we needed access to the back left hoof itself. Tahoma's exhibit was modified a few years back and a training panel door was installed just to the south of his barn. It is 6.4 m long and 2.6 m high. The training panel has two sets of 1.2 m wide by 0.6 m tall swing doors that can be opened independently of the training panel on the top or the bottom. These doors allowed us to gain access to Tahoma's head and feet in a protected contact setting. It is at this door that we do most of our training and socializing. We have also used this door for amazing guest interactions and donor tours. The use of this training door has made it possible to train for valuable husbandry behaviors such as: blood draw, injection, line-up, target, ear present, scale, x-rays, brushing, and hoof work.

When we asked Tahoma to line-up we were able to get a fairly good look at the crack from the side. However, we could not see the bottom of the hoof or attempt treatment before Tahoma was trained to let us manipulate the hoof. When Tahoma would line-up, the criteria had always been for him to place his shoulder against the panel. When it came time to start working with the hoof, we realized that his back half was always just out of reach. We needed him closer to work directly with his hoof. We placed a large log on the ground three feet away and parallel to the training panel which worked great as a guide. This set-up gave Tahoma more power over his environment and our training sessions. He could at any time walk away and never felt trapped or enclosed. This also forced us to make sure that training was highly positive and worth his while to swallow his cud and come over for a training session.

For reinforcers we use: soaked alfalfa (we soak it to prevent the alfalfa from expanding in his stomach), carrots, yams, browse (willow, elm, cottonwood, box elder, aspen), rye crackers, flaked corn and 4-way grain mix. Usually we will have a combination of several at our disposal for any given session. Items such as the carrots and corn are higher value reinforcers and reserved for getting across the message that he just did something really great. When we want him to hold a position for a long period of time, a big wad of soaked alfalfa or a branch of willow do the job nicely.

Once we accomplished the first step of working Tahoma into the proper body position, we started training for the actual hoof presentation. Given that we were under a time crunch due to his injury, we were fairly aggressive with touching and lifting of the hoof. To start, the Face trainer would reinforce every time he would pick up his back left foot. We opened one of the bottom swing doors that gave the Foot mechanic easy access to the hoof. At first the mechanic would touch his hoof or leg to prompt movement. It was a good start, but we required Tahoma to lift his foot much higher and include a backward curl of the hoof so we could see the bottom surface area too. The foot mechanic would place both hands on Tahoma's hoof and pull up slightly. We worked hard and fast on shaping his leg and foot lift, reinforcing for each time he met the rapidly increasing criteria to lift higher.

Part of our training plan was to provide Tahoma a station to rest his hoof. Based on where he was naturally lifting his back leg, we had an idea of the height Tahoma was comfortable with. We needed a foot rest that was easy to maneuver, construct and modify. We found just the right station in a tree stump that was 40.64 cm high and 30.48 cm wide. We folded a towel on the top of the stump and screwed fire hose over it to create a soft and durable resting site for his hoof.

Early on in the training his leg and foot would bounce up and down. The Foot mechanic would have to guide his hoof down to the stump. Each brief touch of the hoof to the stump earned Tahoma a reinforcer. The Foot mechanic would also start to curl his hoof back to suggest to Tahoma the required position of the hoof. The moment the hoof touched the stump we would verbally bridge good and reinforce. Then it was a matter of training for duration as well as his willingness to place the hoof there himself. Each time his hoof stayed on the stump a little longer than the last

rep, he was rewarded for it. Each time he placed his hoof on the stump with no guidance needed, he was handsomely rewarded. With the use of high magnitude reinforcers and the matching law, it did not take long before the Foot mechanic was rarely needed in guiding his hoof to the stump. This took several sessions, but with each time Tahoma became more and more comfortable with the repetition. It was rare for him to walk away mid-session. His body language remained calm and we made sure that we watched for any signs of discomfort.

Another interesting nuance we discovered during this training process was that Tahoma responded better when the mechanic's hand stayed in constant contact with his hoof while it is resting on the stump. Even a slight adjustment of pressure applied from the mechanic's fingers would seem to let Tahoma know that his foot needed to stay in position. It felt like he needed to know that work is continuing and no activity or touch being applied means we are done so he could take the hoof off the station. Once Tahoma was resting his hoof on the stump reliably, we started multiple stimuli such as radiograph equipment and farrier tools. He needed to get accustomed to the feeling of a rasp on his hoof as well as a pick, brush, hoof knife, water, and heat.

It became clear that we needed x-rays of his hoof to determine the hoof wall thickness. Once Tahoma was trained to reliably station his hoof on the stump, we introduced an x-ray plate. Tahoma showed no concern with the x-ray plates being placed at various angles around his foot and leg. Once x-rays were taken, we were able to determine that his hoof wall is approximately 0.6 – 1.5 cm thick. We then knew that with such a thin hoof wall we would need to avoid any treatment options that involved inserting anything into the hoof itself such as a screw or staple. Because the hoof wall is so thin, even a very shallow screw could have gone deeper than the hoof wall and into the lamina or bone, introducing infection in the coffin bone.

The treatment we opted to try first was to apply an epoxy patch over the hoof crack. This treatment is used in horses with similar quarter crack hoof injuries with some success. The patch is glued to the hoof wall with epoxy stabilizing the cracked hoof while it grows out. To do this, the crack is thoroughly cleaned so no infection can develop underneath the patch. Then, the hoof wall around the crack is roughened to enable the epoxy to adhere to the hoof wall. Finally, the patch is placed over the crack and held in place for several minutes while it dries.

To train for hoof patch placement, we divided the training into multiple stages. First, we introduced pouring room temperature water into the crack. We then utilized a large syringe filled with water to clean deeper into the area, followed by a brush and pick to remove any remaining debris. Last we would dry the area off with a towel and then run a file along the side of the hoof wall to rough-up the surface. We needed Tahoma to also be comfortable with heat on the hoof since epoxy gets very warm as the chemicals react. To mimic the feel of warming epoxy on the hoof, we used a hair dryer and would reinforce Tahoma for holding still for up to 4 minutes.

We were able to successfully epoxy several patches using this method, unfortunately the patches always fell off within a few days when we needed them to stay in place and provide stability for ideally 4-6 weeks at a time. We speculate that the patches failed because of the two-toed flexibility of moose feet verses the one toed structure of a horse. As moose walk, their hooves and toes move and adjust to pressure and this proved too much movement for the epoxy to hold.

Our veterinary team then enlisted the help of farrier Steve Foxworth from the Equine Lameness Prevention Organization (E.L.P.O). Steve has worked quite extensively with Denver Zoo on exotic hoofstock such as zebra, kudu and giraffe. The first day Steve arrived we asked Tahoma to get into his back hoof presentation behavior and brought Steve down into the mechanic zone to get a close look at the crack and bottom of the hoof. After examining Tahoma, Steve had a theory of why the crack had formed. Even though Tahoma has a good size exhibit with natural substrate, he is in no way walking as much moose are designed to do. His hooves are not being worn down like they should. The hoof, heel, and toe were overgrown in such a way that pressure

was building on the inside of the hoof and had nowhere to go, hence the crack. An additional factor may be that Tahoma had suffered antler injuries in the years prior on the right antler, opposite side of the hoof crack. This redistributes weight throughout the body and thus alters wear especially for his back left hoof. There's been some association in other cervid species with antler injury and lameness in the opposite back foot. To avoid this kind of injury occurring on any of his other feet, we would need to work towards regular hoof trimming and maintenance. As for the existing hoof crack, we needed to trim and shape the hoof in such a way to take pressure off the crack itself to allow it to heal.

We went back to the training panel and cued Tahoma to present his back left hoof onto the stump. Once in position, Steve started rasping and cutting. He was fairly aggressive, but would stop cutting when he reached the pinkish/white hoof material known as the lamina which lies underneath the hoof wall. Much like a quick in the claw of a dog or cat, if one cuts too deep into the lamina the hoof can bleed and the open sore can lead to infection. He cut a significant amount off of the hoof wall as well as along the crack line. We were concerned that the crack would move further upwards towards the coronary band so by shallowing the crack and the hoof wall at the walking surface this helped decrease the torsional stress on that part of the hoof and hopefully prevent it from splitting upwards. This whole session took about 10 minutes and Tahoma held like a champ! All the hard work and training paid off and we then had a treatment tactic to proceed with.

To date we have monthly visits from Steve to re-access and trim. Our veterinary team also regularly inspects the hoof. Recently, we introduced a battery powered dremmel into the mix of hoof trimming tools used to assist in keeping pressure off of the crack site as it continues to heal. This kind of hoof injury can take at least a year to fully grow out. Maintaining his hoof present behavior is critical to the healing process. When the crack was first discovered Tahoma was showing some lameness, but fortunately this is currently no longer the case.

At this point we are thrilled that the crack is growing out nicely and we have moved on to training the presentation of his right front foot. We initially used the same stump that worked so well with the back hoof, but found that he seemed more comfortable with his front foot rested in an even higher position than his back. We are currently using an old metal elephant foot stand. With some slight modifications, mostly padding in the cradle of the foot rest, it is working very well. We set the adjustable stand at 58.42 cm high. The trainer uses a verbal cue, front foot, and Tahoma will curl and place this foot on the cradle of his new station. We are not under the same time crunch to train for presentation of his remaining hooves as we were with the original injury. This has allowed us to train with very little prompting from the Foot mechanic and give Tahoma more control in the session. We quickly faded out the mechanic touching his hoof and now focus on the location of the station and reinforce Tahoma when he places his foot in the cradle. Steve has been able to do some dew-hoof trims and minor rasping on his front right foot. Our goal is to have routine hoof work maintenance performed on all four hooves within this year.

Through all of our training with Tahoma we quickly had to establish a very open and fluid form of communication between trainer, mechanic, and moose. All three had to be equally engaged in the session and alert to any subtle changes. For instance, we soon started to recognize when Tahoma needed a break from training, especially when nature called. He would start to get antsy, shifting his weight from leg to leg and he would lose focus. He would start looking around and even his eyes would get a little bigger. When either the trainer or the mechanic started to notice these signs we would suggest a break in the session. Both keepers would take a step back giving Tahoma the okay to leave the training panel. Once relieved, Tahoma would come right back and be much more focused for the rest of the session.

The body position of the trainer can also make a huge difference in a session. Tahoma likes

the trainer to be near his eye and ear. It seems like the communication between moose and trainer works better this way. The trainer can easily reinforce and also get a view of what is going on down at the foot end. This position also allows the trainer to watch Tahoma shifting weight in preparation for lifting his hoof. This is the best time for the trainer to give the verbal cue. By anticipating his movement we can strengthen the cue and set both trainers and moose up for success. In tandem the foot mechanic can also recognize this weight shift and be prepared to guide the hoof, if needed, to the station. With all that being said, depending on the mechanic's body position or if there are multiple people working on Tahoma's hoof, this can block most of the trainer's view. This is when communication is key. The mechanic must then interpret what is happening and when to bridge and reinforce. There are times when the mechanic does most of the verbal bridges and the trainer will second the verbal bridge and reinforce based on the enthusiasm of the mechanic's voice. A very high and excited bridge or a "Very, Very Good" will earn Tahoma a much higher value reinforcer.

Tahoma is very comfortable with a good amount of people being around him during these sessions. All of our training is done on exhibit, during business hours. We want our guests to see how we care for our animals and understand the value of training and husbandry care. We will usually have to appoint someone to be the interpreter. We provide them with a pair of antlers, some moose fur and a solid understanding of what we are doing. On the service side of the gate there will often be several members of our veterinary staff, their students, our volunteers and interns, and if it is a Steve day, his team as well. It sure can get cozy! The beauty of it all is Tahoma takes it in stride. He is not suspicious of new people in his immediate vicinity. Overall we feel that this is proof that he is confident in his environment and the power is all his because he can walk away at any time.

Rocky Mountain Wild staff has a reputation for being comical and chatty. We bring this jovial attitude to our sessions. There has been many a laugh, sometimes song and multiple conversations happening all around us when we train. It is us in our natural state and Tahoma picks up on that. The animals we work with can read our body language in a blink of an eye. Being ourselves around an animal we spend so much time with is an asset. This fun and loose atmosphere works for us, but find what works for you. The critical thing is to be natural, at ease and positive.

Tahoma will be turning seven years old this May. Over the past year his nose has grown some grey but otherwise he is not showing signs of slowing down anytime soon. He is both a guest and staff favorite and we hope to have him around for many more years to come. We are determined to address his short and long term hoof maintenance needs, nurture the strong training relationship between staff and moose, and practice open and clear communication each time we work with him, be it on the Face or Foot.

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We have one of the best farrier's around in Steve Foxworth, from the Equine Lameness Prevention Organization.

The support of our management team at CMZ has made all this training possible. Thank you to Bob Chastain, Roxanna Breitigan, Jason Bredahl, Megan Sanders, and Jeremy Dillion. One of the true perks of our job is to work directly with animals that inspire and challenge us. Tahoma has made a lifelong impression on me and with his help we are blazing a new trail into moose hoof work. Thank you Tahoma moose.

Exploring the Training of a Blue-Breasted Kingfisher for Use as a Program Animal

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Cincinnati Zoo and Botanical Garden

The breeding pair of Blue-breasted Kingfishers (Halcyon malimbica) at the Cincinnati Zoo abandoned nesting for a reason that was unknown to the keeper staff. Additionally this pair of birds also chose to remove the clutch of eggs from their nest cavity and toss them onto the floor of their enclosure. All of the eggs were found broken except for one. Because it was unbroken this egg was able to be artificially incubated and fortunately it eventually hatched. The resulting bird was named "BB" and she was hand-reared from day one and eventually was trained to became an outreach program animal. This paper will describe the various steps of positive reinforcement training which were used to stick train her, crate train her, and to train her for use as a program animal. Also, this paper will explain what role she is currently filling as an animal ambassador.

Never Too Old: Voluntary Injection Training with a Geriatric Amur Tiger

Vicki Hardstaff
Toronto Zoo

*After rearing her second litter of cubs, Amur tiger (*Panthera tigris altaica*) Tatiana began experiencing lameness in her hind legs. After several stressful knockdowns to diagnose and treat her condition, and at the age of 14, Tatiana was enrolled in a training program in hopes of reducing stress during future medical procedures. With the ultimate goal of training her to accept a voluntary injection, progress was met with numerous challenges from establishing a suitable reinforcer, to dealing with a mistrusting and sometimes aggressive tiger, as well as contending with the physical limitations of a geriatric animal. Perseverance prevailed and 18 months after her training began, Tatiana was allowing injections of saline. During this time, Tatiana was voluntarily sedated, without stress, to allow for a medical check-up as well as an internal transfer due to construction. Sadly, her check-up revealed that she was suffering from the final stages of cancer and, with no options for treatment, staff made the difficult decision to euthanize her. Although her first voluntary sedation also ended up being her last, Tatiana's training journey demonstrates the value of utilizing positive reinforcement training to better manage any animal, regardless of age and attitude.*

The Amur tiger, formerly called Siberian tiger, was recently renamed as they are now restricted to the Amur River Valley of Russia, and are no longer found in Siberia. They are the largest sub-species of tiger and the largest member of the cat family with males reaching over 600lbs. They are also the most northern type of tiger and, as such, have large, heavy bodies with thick fur and paler stripes for better camouflage in the temperate forests where they live. Although deer are their favourite prey item, they have also been known to hunt brown bears. Like all sub-species of tiger, they are critically endangered with only 450 individuals remaining in the wild.

Tatiana, a female Amur tiger, arrived at the Toronto Zoo at the age of 3 as part of a breeding loan from the Calgary Zoo. Amur tigers are part of a Species Survival Plan and Tatiana contributed to the program, rearing two litters of cubs over the years. Tatiana had always been an aloof and temperamental animal but she became plain old crotchety with age. She had no formal training history.

After rearing her second litter of cubs at the age of 9, keepers began to notice lameness in her hind end. X-rays revealed she had degenerative joint disease. Her hip joints were almost fused and had no cartilage left. Although there was very little that could be done to fix the problem, her discomfort was lessened via surgery. She underwent a bilateral hip denervation procedure, a severing of the nerve running to her hips so she could no longer feel pain. She also suffered from a bout of mastitis, an inflammation of the mammary gland. All of this meant that Tatiana underwent numerous sedations for examination and treatment. Immobilizations involved darting by a vet. This was a very stressful and scary procedure for Tatiana. Watching an immobilization inspired keepers to take action as there was no question that she would require further medical treatment. The goal was to train Tatiana to accept a voluntary injection, thereby minimizing stress during future examinations.

Training began in the summer of 2010 at which time Tatiana was 14 years old. Tatiana was quite overweight and it was not uncommon for her to turn her nose up at food. Vets had recommended that she lose weight to alleviate the added stress on her joints. Her weight wasn't

helping her motivation or interest in coming over for food. She was also leery and reactive of slides being closed in the holding and was not comfortable being confined to one pen. So initial goals were as follows: get a better handle on her diet while also encouraging weight loss; find food items that she finds reinforcing; get her to come over for those items and improve her comfort level in the holding.

The first step was very simple; a diet. This was accomplished by slowly cutting back the ground horse meat that made up the bulk of her diet. Several novel food items were introduced with varying degrees of success. Milk, chicks and chunk horse meat were her favourites and these items were reserved for training. Initially training items were left with her as she wouldn't always eat in front of staff. Once her food motivation and comfort level improved, she would eat in the proximity of keepers and food was tossed to her. This progressed to eventually having her come over to staff for food. At the same time, she was desensitized to the opening and closing of slides while she was eating.

Four months after training began, Tatiana was consistently taking food from keepers, coming when called and was much more comfortable with slides being opened and closed. The next phase of Tatiana's training was introducing a bridge and target. She caught on quickly to the bridge, a whistle, but targeting was a different story. She was initially leery of the target stick, and exhibited some aggression towards the stick although it was usually only mild, hissing and snarling. With some patience and very small and slow approximations, she was targeting well within a few months although the mild aggression was never completely eliminated. A second person was also introduced during training sessions. She was not overly bothered but it was dependant on the person and on the day.

Tatiana next needed to be trained to lay down on cue so she was in a position conducive to administering an injection. This was easier than expected as Tatiana would often lay down during training sessions if they lasted longer than a few minutes, likely due to her stiff old hips, so the behaviour was captured and put on cue. However, because of her hip condition, Tatiana could not crouch down like most tigers. Her 'lay down' was more of 'sprawl out' and her hip was nowhere close to being in a position where an injection could be administered. So, it was time for a change of plan. The behaviour would be trained in a standing position, utilizing her shoulder for the injection site. Environmental manipulation was used to guide her into position, with the aid of a target. A jug partially filled with water, positioned close to the bars of the pen, was the guide although this was eventually replaced by cinder blocks for more stability. Once in position, her shoulder was desensitized to being touched with various blunt instruments, working up to 'pokier' items. Although not terribly impressed by the desensitization, she was surprisingly tolerant of the process. Within a few months, staff were able to poke her with a needle, beginning with a tiny 26 gauge needle but working up to a larger 21 gauge needle. And, within a few months of the introduction of a needle, staff began injecting her with small doses of saline. She was again very tolerant and did not seemed too bothered by the procedure. So, from start to finish, Tatiana's voluntary injection training had taken about 18 months.

In the spring of 2012, the Toronto Zoo was busy preparing for the arrival of Giant pandas. The zoo's out-dated tiger facilities were being renovated and would house the pandas during their 5 year stay. This meant that Tatiana needed to vacate the premises and would be moving to the zoo's Sumatran tiger area for retirement. As she was due for a health check, it was decided to sedate her for an examination and move her at the same time. Vet staff were willing to let keeping staff attempt the sedation using training. By this time, Tatiana was 16 years old.

The day of the procedure access to the tiger holding was restricted to one keeper. Although she was tolerating a second person in the holding during training sessions, keepers didn't want to risk having a vet present as, in the past, Tatiana had reacted very negatively to their presence. Vet

staff divided the sedative into two separate syringes. The first was a very small amount, about half an ml, of a strong sedative called metetomidine. This way, if the keeper was only able to administer this first dose, it would at least make her groggy enough that the second dose could be easily pole syringed. The second syringe contained a much larger amount of second sedative called midazolam, about 2.5 mls. Tatiana was a little crustier than normal the morning of the sedation, as she had been waiting longer than usual due to the timing of the procedure. However, she was eager to participate and positioned well for the injection. The first dose of sedative was easily administered and, as she remained in position, a second injection was also attempted with the keeper getting most of that in before she walked away to lay down. Vet staff at the Toronto Zoo do allow keepers to feed a minimal amount of food during voluntary sedations so Tatiana was given a few very small pieces of meat during the procedure. She fell asleep peacefully within 5 minutes of the injections.

The speed at which she fell asleep was the first indicator that something wasn't right. She wasn't breathing well and was difficult to stabilize. Once at the hospital, a more thorough examination revealed that what had started as mastitis had developed into full-blown mammary cancer. She was also suffering from numerous other complications, perhaps due to the cancer, including an enlarged spleen and masses in her liver. With her advanced age, there were no options for treatment other than keeping her comfortable, so staff made the very difficult decision to euthanize her while she was still under sedation. At the time of her death, she was showing no obvious signs of distress, at least outwardly, so staff believe that her last few months were comfortable and she was certainly able to die with the dignity that she deserved. Without a doubt, positive reinforcement training had improved the quality of Tatiana's golden years. She had learned more than just a bridge, target and how to present her shoulder for an injection. She had also learned to trust.

So, although her first voluntary sedation also ended up being her last, Tatiana's training journey demonstrates the value of utilizing positive reinforcement training to better manage any animal, regardless of age and attitude.

Learning the Power of Positive Reinforcement from a Fossa: Changing Panic to Cooperative Injection Training

Jennifer Ziegelmeyer Archibeque, Lisa Clifton-Bumpass
Happy Hollow Park and Zoo

Female fossas (Cryptoprocta ferox) are known to partially molt their coat as a part of the estrus cycle leaving exposed skin. "Roni", the 0.1 fossa residing at Happy Hollow Zoo in San Jose California, exhibits signs of excessive molting in addition to extreme seasonal allergies affecting her on and off exhibit behavior, appearance and welfare. After many unsatisfactory oral medication trials and a complete allergy skin test, it was determined the best long-term treatment for seasonal atopic dermatitis would be weekly subcutaneous immunotherapy injections to begin immediately and continue through her lifetime.

A cooperative injection behavior was trained while simultaneously using behaviors under stimulus control in order to start the treatment. The complete injection behavior was a result of chaining operant behaviors while creating a strong positive conditioned response to medical staff and the squeeze chute via classical conditioning. We will discuss the challenges of training a complex behavior with novice learners, overcoming Roni's fear of the squeeze chute as a result of her aversive events history associated with the chute, the changes in animal behavior measured by reduced anxiety, Roni's preference for various reinforcers, and the considerations of training a behavior while it is being used for a medically requisite aversive procedure. Using positive reinforcement, we have seen a dramatic increase in animal welfare through the immunotherapy treatment and positive changes in overall animal behavior, particularly during training sessions over the course of eighteen months.

Weight Management in Animal Training: Pitfalls, Ethical Considerations, and Alternative Options

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Weight management is a practice that has been used in training birds for many years. This strategy involves determining a weight range in which a bird may be more likely to respond to food as a reinforcer for training or maintaining behaviors. This is a strategy which is rarely used to train in other taxonomic groups. This paper will explore the pitfalls of relying on weight as a measure of motivation. This includes trainers becoming desensitized to bird body language indicative of excessive motivation for food reinforcers. It will also explore ways to measure motivation for food that are not related to the number on the scale. It will also question the ethics of using weight management in animal training and provide alternative options which are commonly used to train other species of animals.

Background

The International Association of Avian Trainers and Educators defines weight management as follows:

Weight Management
Because the weight and appetite of an animal are valuable indicators of its general health, monitoring a bird's weight can be a valuable tool in understanding its motivation to present a desired behavior as it relates to various weight ranges. Once a weight range that corresponds to acceptable behavioral responses to food is established, a diet is prepared to maintain the bird in that weight range. The weight range may be adjusted depending on response during training sessions. Various conditions may influence behavior, such as weather, age, food items, etc. and should be taken into consideration when evaluating weights and diets. These weight ranges may also vary between individuals of the same species. The goal is to maintain the highest weight possible and provide the greatest amount of food while maintaining the desired behavioral response. This practice is referred to as "weight management." (1)

Weighing an animal to monitor for changes that may indicate health issues and also to maintain what is deemed a healthy weight for an animal (avoiding obesity, monitoring growth of young animals, etc.) are separate topics from weight management for creating motivation for food. While these are important tools in general health care, the focus of this paper is the use of weight management to facilitate animal training.

The weight management approach requires utilizing specific quantities of a diet to maintain the desired weight range. While this quantity may not represent a deficiency in food, in research settings it is generally termed a quantitative restrictive diet as opposed to an ad libitum diet in which the animal has free access to food at all times. It is also important to note that restrictive diets are not available to the animal at all times and therefore result in periods of deprivation. Deprivation is the term used to describe when something (in this case food) is not available; this does not necessarily mean that the diet is of insufficient quantity for the animal in training. These intervals in which food is not available are important to note as they can play a significant role in motivation for food reinforcers. Additionally note-worthy is that chronic deprivation has been shown to have a much greater influence on feeding motivation than acute sudden

deprivation (2) which will be discussed more later.

Hunger and Motivation

In animal training words like hunger and motivation are easily interchanged. However in reality hunger and motivation are two different discussion items. Hunger is not well defined in literature. It is generally agreed to be a negative subjective state (one from which animals will work to obtain relief). Inspired by the Brambell report, the first of The Five Freedoms by The Farm Animal Welfare Council states that animals should have **Freedom from Hunger and Thirst -** by ready access to fresh water and a diet to maintain full health and vigor. (3)

In the lab setting hunger can be measured as a metabolic state. This requires sampling not practical in the real world of animal training. Hunger is also sometimes measured by a change in "normal" expression of non-feeding oral activities such as redirected pecking in chickens and stereotypy. Also measured in chickens is drinker use (pecking at water and water consumption). Other behavioral measures include how quickly the animal eats, presentation of compensatory feeding behaviors, and activity levels. Operant responding is also used as a measure, usually comparing how the animal responds to a task soon after a meal and then again at various intervals later. (4) This can include measuring the force of the response, response latency and relative frequency of responses. (5)

Animal trainers who look at behavioral response as a means of measure of hunger typically rely on the operant response strategy, looking at an animal's body language and species-typical behavior with food. *For example, when a pine nut is offered to a macaw in a training scenario in which the bird is relaxed and comfortable and being asked to do nothing but accept food or perhaps present an easy to accomplish behavior that has been trained to fluency, the following observations could be used to rate hunger: See Table 1. (6)*

Table 1. Assessing interest in reinforcers. Example: Macaw is offered a pine nut.

Observed Behaviors	**Level of motivation**
Holds pine nut in foot	Low
Bites tiny pieces off of pine nut slowly	Low
Drops half of the nut	Low
Wipes beak on perch (feaking observed)	Low
Proceeds to preen after drops nut	Low
Holds pine nut in foot and brings to mouth quickly	Medium
Quickly breaks nut into 2-3 pieces and swallow pieces	Medium
Directs attention back to trainer once nut is consumed	Medium
Swallows nut immediately without breaking into pieces	High
Quickly directs attention to trainer once nut is consumed	High
Offers trained behaviors in rapid succession	High
Presents behaviors equated with frustration or anxiety about food: may redirect aggressive behavior on nearby objects, birds, or people, stereotypic pacing, etc.	Excessive
Aggressive behavior presented towards other birds if competing for the same food resource	Excessive

In other words, there are observable behaviors that animal trainers can use to rate hunger. These observable behaviors will vary with species, for example a hawk may show behavioral responses that are different from a parrot. Although a potentially daunting task, animal training would benefit from clear definitions of measures of hunger, especially since food is commonly used as a reinforcer for behavior. The Five Freedoms state that the animal should have freedom from hunger. In the animal training world this leads to questions such as "at all times?" and is "any level of hunger acceptable?" Having measures of hunger and identifying ranges that are acceptable and not acceptable by the animal training industry, and why, gives animal trainers a guideline, or at least a starting point, to better evaluate hunger based on behavioral observations. This may in the future help address the questions raised by the first of The Five Freedoms. More importantly, it can potentially lead to improved welfare in animal training by helping trainers recognize when hunger is exceeding acceptable standards. It can also help provide an honest interpretation if assumptions are being made that an animal is hungry or must be hungry for example due to a late feed.

Motivation to present behavior is much broader than hunger. Animals present behaviors for many different types of reinforcers. Extinction procedures can cause vigorous presentation of behavior. Different schedules of reinforcement can allow numerous or extended presentations of behavior before reinforcers are delivered. Some humans present food acquisition behavior in the absence of hunger and it is also observed in animals as well, particularly those that cache food. This is a just a short list of items to consider when evaluating motivation. This distinction between hunger and motivation is important because it allows trainers other options for acquiring behavior that do not rely solely upon hunger.

Pit Falls & Ethical Considerations

In the definition for weight management, a weight range is identified that corresponds to an acceptable response for food. This may appear to be another means to measure hunger. However, in practical application what is often observed is a fixation on maintaining the bird's weight in the identified range as opposed to evaluating hunger based on behavioral response. This results in other observable behavior or physical manifestations that could be indicative of an inadequate quantitative restrictive diet. The following are observations that may signal the weight management strategy is poor and is not adequately addressing the needs of the animal:

Frantic or Anxious Behavior

Animals may show frantic behavior in the presence of food, when eating or when a stimulus is presented that is a potential indicator of food. Trainers may become desensitized to this response and consider it a "normal" hunger response or level of motivation for food. For example, pigeons used in a behavioral analysis lab were weighed daily and fed a quantitative restricted diet by the lab students. The students were instructed to feed specific amounts based on the weights of the animals. The pigeons thrust themselves against the front of the cage when students were preparing to deliver food. When offered food, it was consumed very rapidly. Once fed, the animals sat calmly. However if the students reached or walked towards the food bin the pigeons would immediately throw themselves against the front of the cage again. On a side note, bright green fecal matter was also observed, which is typically indicative of compromised health/welfare in pigeons due to lack of food. Behavioral and physical data were not being properly evaluated and considered in this weight management situation.

It has been demonstrated that appetitive food cues presented to organisms in a high drive state when actual consumption is not possible promote a state of frustrative nonreward. Researchers have emphasized the aversive nature of nonreward in deprived animals. Furthermore when

food is withheld, food cues potentiate the probe startle response. The enhanced startle response for food-deprived subjects suggests that, to some extent, food cues elicited an aversive motivational reaction. Frustration generally involves heightened anxious arousal; hence, negative affect. The reports of greater arousal and loss of control from food-deprived subjects are consistent with this interpretation. There is also evidence that food-deprived rats, given food cues separately from feeding, also show decreased pleasure as a function of hunger. (7)

Water gorging/ Food related stereotypies

Studies show that rats drink more water when food deprived (8) There is also evidence that overdrinking can be a stress related behavior. (9) Birds that are food deprived may show increased drinking of water. (10) Broiler hens that are food restricted and allowed access to ad lib water can overdrink water. Because of this, water can be provided for a few hours per day, but it can exacerbate the frustration caused by food restriction. (11) Rushen suggests that the occurrence of adjunctive drinking by sows results from the persistence of feeding motivation, perhaps because concentrated food does not provide sufficient stomach distension, combined with the knowledge that food will definitely not be forthcoming. Stereotyped sequences of behavior may be a means of reducing the arousal generated by the expectation of food. (12) Birds, especially those known to eat several times a day or throughout day have been observed water gorging in show settings. Water gorging should be considered an indicator that the feeding strategies are either inadequate in quantity and/or frequency. This can also result from long term chronic quantitative restricted feeding.

Stunted growth

In the poultry industry breeder broiler chickens are selectively bred to grow quickly. When these birds are fed ad libitum this results in extremely overweight birds with a myriad of physical problems. To address this, many breeder broiler hens are intentionally placed on quantitative restrictive diets to stunt growth. (13) Stunted growth has been observed in macaques on restrictive diets when young. Researchers are advised to ensure sufficient food is provided to maintain normal growth rates whilst continuing to perform the behavioral tasks effectively in research settings. (14) Stunted growth is also used as a measure of poverty and malnutrition as a result of inadequate feeding in humans. (15) Unfortunately stunted growth has also been observed in birds in bird shows, especially those that have been placed on quantitative restrictive diets during their first year.

Persistent juvenile behaviors

A phenomenon that has been observed in some species of birds that are entered into a quantitative restricted diet during development is the persistence of juvenile behaviors into adulthood. In pscittacines this results in the observation of head bobbing behaviors, vocalizations associated with food begging and head feather erection similar to what is seen in fledgling aged and younger parrots. In parrots that remain on a quantitative restricted diet, as is done in weight management, these behaviors persist for many years into adulthood. It is possible these behaviors also remain due to reinforcement history, and/or imprinting on humans, however they have also been observed to go away if the bird is allowed access to an ad libitum diet for an extended period of time. This persistent presentation of juvenile behaviors when on quantitative restrictive diets has been also observed in ground hornbills, vulture species, ibis species, crows and ravens. A reverting to juvenile behavior has also been observed in parent raised hawks when placed on a very restricted diet.

Other possible health issues

It is difficult to thoroughly ascertain all the possible impacts short term and long term quantitative restrictive diets can have on animals being trained via this approach. Adequate nutrition and caloric intake affects numerous functions including feather production, bone density, and brain chemistry. Some speculations have arisen in regard to a correlation between quantitative restrictive diets and feather damaging behavior observed in hawks that is initiated when placed on restrictive diets. Noting the behavior was absent on an ad libitum diet, Dr. van Krimpen also found that increasing behavior related to feeding and satiety by dietary changes successfully reduced feather pecking behavior in chickens. (16) It is possible future exploration into the topic will reveal more correlations between health issues and long term restrictive diets.

Other fallout

An unfortunate observation is that weight management has been presented to the companion parrot community several times as a solution to creating motivation in pet parrots. Most trainers would agree that the application of weight management strategies is something that should be learned under the guidance of an experienced professional. This cautionary approach is to avoid many of the examples of poor application previously mentioned. It is also to help determine if indeed weight management would facilitate creating motivation for food. This leads to the question is weight management appropriate or even necessary in the companion bird world? The species of birds most commonly kept as companion animals typically include species whose natural history allows for a large diversity of potential reinforcers (social interactions, allopreening, enrichment, etc.) Additionally many include feeding and foraging strategies that respond extremely well to food management to create motivation for food. Food management is defined by The International Association of Avian Trainers and Educators as managing when and how food is delivered, what food items are offered, and the ratio of food items offered to create desire to present behaviors for food reinforcers. (17) Micromanaging weights and diets for these species is typically not necessary and can put companion animals at risk due to improper guidance.

Psychological Appetite

The previous examples illustrated what can happen when focus is primarily on keeping a bird within a certain weight range. Often the recommended objective is to work the bird at the highest weight possible. An example often used to suggest successful application of weight management is when the animal's working weight is higher than what it would be if fed ad libitum. This motivation to present behavior in this situation has gone by several names, including psychological appetite, psychological hunger, and most recently food paradox in certain bird training circles.

Malina states psychological appetite is the creation of a perceived feeling that there is a food shortage. The result is that the bird is more likely to be motivated to take advantage of the opportunity to obtain a food item. Psychological appetite is produced through creating a perceived food shortage based on how the food is presented. When combined with variable reinforcers and small windows of opportunity, psychological appetite provides increased motivation without having to reduce an animal's body weight. As the birds' weight continues to increase, the bird is working on habit and *psychological* appetite. If something causes the bird to fly off and sit in a tree, it may stay out longer if it feels there is no real drive to satiate its appetite. As you can see, while weight management is a factor in creating psychological appetite, once created, that psychological appetite can allow you to successfully work your birds at or above their ad-lib weights (18)

There are several challenges with this interpretation. Psychological appetite suggests an animal is not experiencing hunger. It also suggests that weight is linearly related to hunger, and

that an animal is not experiencing hunger at a higher weight, all implying good animal welfare. However, as has been demonstrated, hunger is not the same as motivation and different measures need to be applied to ascertain if the animal is experiencing hunger. Additionally animals can and do experience hunger despite higher weights - a fact certainly not lost on an overweight person attempting to lose weight, or overweight animal that didn't receive its anticipated meal. In addition, other factors can influence hunger that are not related to weight, such as time elapsed since the last meal was consumed. So while an animal may have a higher weight, it may very well be experiencing hunger.

Another aspect of this training strategy that poses welfare questions is the perceived shortage of food. Psychological appetite is comparable to food hoarding/food maintenance behavior seen in humans and also rats. When humans are deprived of food, they have a very predictable response: they become obsessed with seeking food. This has been shown in studies of people deprived of food throughout history, for example, children adopted from food insecure areas, survivors of concentration camps, prisoners of war, or people lost in the wilderness after accidents. Mildly or moderately food deprived children will exhibit this behavior problem as a response to a time or times in their life when they didn't have enough to eat, and could never be sure when their next meal would occur. The inconsistent availability of food can lead to behaviors like overeating and secretly hoarding food when it does become available. While this may make sense in a food-insecure situation, many children continue this behavior even when they are in a safe environment with plenty to eat. They will binge eat when food is available and store food for later, often making themselves sick because their bodies are not used to so much food. (19, 20) Rats also hoard food or eat too much after being starved for long periods of time. Rodents are not gastro intestinally suited to true binge eating comparable to that of humans but those on calorie restriction pack in as much as they can when food is available. If experimental protocols permit, they also stash whatever they can carry. In rats, perhaps the most basic indicator of the proposition that calorie restricted animals "feel hungry" is that—given the opportunity—they all eat substantially more than they are allocated on other feeding regimens. (21)

Some parallels we observe are that even birds working above ad libitum weight and perceived to be responding due to psychological hunger are often obsessed with food acquisition, anxiety before feeding times, gorging when food is available, and overeating until sick when put on feed up or free feed. These are especially prevalent on animals that have been exposed to restricted diets for long periods of time. The Society for Neuroscience has adopted the US Public Health Service Policy on Humane Care and Use of Laboratory Animals (2002), which recommends that unless the contrary is established, researchers should consider that procedures that cause pain or distress in humans may cause pain or distress in other animals. (22)

While a perceived food shortage may allow a bird to have motivation at a higher weight, it raises the question of whether this is an acceptable psychological state for birds in an animal training program. A frequently presented argument is that psychological appetite replicates a natural occurrence in the wild. Animals don't always have food available and must seize opportunities when they arise. The crucial difference is that animals in the wild have the opportunity to seek food. Animals that do not have food seeking opportunities and are on restricted diets have been shown to have an increase in presentation of food/oral related behaviors such as repeated pecking at water in chickens that can develop into stereotypies. (23) Stereotypy is highly prevalent in captive domestic pigs. In large commercial production systems, pigs have minimal complexity in their housing systems. The combination of a frustrated feeding motivation combined with a lack of foraging opportunities highly impacts this problem. (24)

Animal trainers often speak of choice in animal training, but are weight managed animals really at liberty to choose when to seek/acquire food? Having no control of the opportunity to ac-

quire food except under very limited conditions is not analogous to an animal that may be food deprived but has the opportunity to behave to potentially acquire food. Also, in the wild, food can be abundant for prolonged periods of times, and is usually not chronically restricted to limited quantities creating long term deprivation as opposed to acute deprivation. Although still diminished compared to the wild, it is possible that some birds such as those flown in falconry, or presentations that allow more unstructured flying with a large variety of generalized behaviors, may be experiencing better opportunity to express seeking behavior than a bird flying consistently patterned A to B's .

Another explanation sometimes given for the response of a weight managed bird presenting behavior at a high weight is contrafreeloading. Contrafreeloading says that animals will expend energy to forage even when food is readily available. Some trainers and researchers interpret this as the animal wanting to use its adaptations to acquire food. A key factor in contrafreeloading is that the animal is exploring *other* opportunities to acquire food while at the same time comparable food is available and easily accessed. Additionally, some researchers believe contrafreeloading may not be about the reinforcing qualities of doing behavior, but about the information that is acquired by doing the behavior. Information that leads to future resources is reinforcing. It has also been observed that contrafreeloading is relatively decreased when animals are hungry (25) - instead they go directly to the known food source.

Relief Response Vs Behavioral Bliss

Observant animal trainers have noticed a difference in the way birds behave when presenting an action for food reinforcers in which motivation is created with different approaches. A behavioral bliss point occurs when an animal is given free access to alternative activities and will behave in a way to maximize its reinforcement (26) Birds that are trained with a behavioral bliss approach tend to show relaxed behavior in the presence of food. It appears they understand reinforcers are forthcoming. They do not experience deprivation to the point that they are either physically or psychologically concerned about food. They will take food when offered, but do not appear anxious or concerned about food. In contrast, those trained with a weight management approach exhibit much more focus on food acquisition. This may be because the animal is either hungry or not sure when the next meal is coming, and is therefore eager to eat when food is available. Animals in both conditions will perform behavior for food, and the process of training that goal behavior may be identical in terms of a positive reinforcement approach, but the body language of those birds will look quite different. This is because the motivating operations are different. The weight managed animal is seeking relief from hunger or a perceived food shortage, while the other is seeking the pleasure of the desired consequence. It is important to recognize there is a difference in these motivating operations, and the difference has welfare implications.

Discussion

In research settings utilizing primates, the primary animal welfare concerns associated with the use of food control protocols are: (i) the risk of nutritional imbalances, depending on the reward type and diet used; (ii) the potential for weight loss (or poor growth, in the case of growing animals) from programmed or non-programmed restriction; and (iii) the aversive experience of hunger. (27)

As discussed, weight management in bird training can impact animal welfare when applied poorly. This can include excessive hunger, stunted growth, water gorging/food seeking stereotypies, persistent juvenile behaviors and possibly other potential health problems. Weight management, when applied properly, may create a psychological state that also has poor welfare implications. While weight management can create the desired motivation for animals to present

behavior (when applied well or poorly) the question becomes whether it is an ethically appropriate tool in animal training.

In the bird training world weight management has a long history of use; unfortunately this long term use doesn't necessarily equal best practices. The animal training industry has made tremendous changes in its approach to influencing behavior in the last 50 years. Many trainers have embraced force free science based training technology. Bird shows are removing equipment from raptors and free lofting birds as much as possible, and birds are being trained to do behaviors once thought impossible, such as allowing blood draws and injections without restraint. Approaches in animal training are evolving, and traditional practices are being questioned. Exploring alternatives to the use of weight management as a primary means of creating/measuring motivation for food needs to be a part of this evolution.

Many trainers already incorporate strategies that reduce or eliminate the need for weight management to create motivation for food. For example: animals can be trained immediately preceding normal meal times, meal times can be staggered throughout the day to increase training opportunities, base diets can be provided at all times while preferred foods are saved for reinforcers to be offered during training, reinforcement schemes in which less preferred reinforcers are offered first and most preferred last, small pieces of food can be offered to allow for more repetitions before satiation, and/or the animals regular diet can be offered during training only. If any reduction in food provided is considered at all, the period is short lived. Once the learning has occurred, diets are quickly returned to levels considered typical for the animal. There are many examples in which the listed strategies for managing the delivery of food have proven to be successful in creating motivation for food reinforcers without compromising the health and welfare of the animal. (28) These strategies have been used for birds in both free flighted/free roaming situations and/or more controlled environments. It is also interesting to note that weight management as a means of creating motivation for food is predominantly seen in bird training (primarily bird shows and falconry) and in some research settings. It is rarely used to train other taxonomic groups.

Bird training also needs to consider the role of nonfood reinforcers in animal training. This also leads to the opportunity to include a variety of reinforcers as a means of increasing motivation. Atlantic bottlenose dolphin trainers at the Aquarium of Niagara Falls documented a significant increase in consistent performance of behavior when they introduced a variety of nonfood reinforcers into their repertoire. (29) Many species in bird shows are social, engage with enrichment readily, respond favorably to touch, forage frequently, cache, respond to sights, sounds, movement, etc. For example a male satin bower bird on exhibit was easily reinforced for behavior by offering blue items that could be used to decorate his bower. Pscittacines in particular can easily be successfully trained without the use of weight management due to the long list of nonfood reinforcers to which they often respond.

In addition, many marine mammal presentations consider the use of other schedules of reinforcement (besides an FR1) much more in their training strategy in comparison to bird shows. A marine mammal presentation typically has a limited number of animals to present during a 20 to 30 minute show. This means a single animal may be required to present a variety of behaviors over a longer duration than most birds in bird shows. Different schedules of reinforcement can add unpredictability, and when applied properly, can increase motivation. The combination of a variety of food and nonfood reinforcers and different schedules of reinforcement can contribute to an animal that is engaged in training for a longer duration.

The animals also typically know a variety of behaviors and may not know which behavior will be asked next. This approach is different from many bird shows in which animals are presenting the same behavior or repeated flight patterns each show, with a predictable reinforcer waiting

at the end. Malina states in her description of psychological appetite "As the bird's weight continues to increase, the bird is working on habit and *psychological* appetite. If something causes the bird to fly off and sit in a tree, it may stay out longer if it feels there is no real drive to satiate its appetite". (30) It is easy to see if a bird is trained to present a patterned behavior with a predictable reinforcer, that if it were to stray from its consistent path it might be difficult to regain its attention and focus without the use of elevated hunger. However with training strategies that include generalized behaviors, a variety of reinforcers, different schedules of reinforcement, and a variety of trained behaviors that are requested unpredictably, it is possible that bird training for shows could reconsider the need for weight management as a means of creating motivation.

It is interesting to note that most bird training begins without the scale. If a bird has no training history and no identifiable nonfood reinforcers, many trainers begin by offering food and evaluating motivation for food by observing behavioral response. Some trainers advocate getting a bird trained to stand on a scale as soon as possible and focus on a weight management approach. However this can cause focusing on weight to become the priority. While acquiring the weight might be helpful for monitoring health, encouraging trainers to continue to place emphasis on behavioral response and incorporating food management strategies can support a move away from weight management. This is also when having industry guidelines of observable measures of hunger and acceptable parameters would be helpful. It is in the best interest of the animals and the industry to teach trainers how to better evaluate and rate hunger using observational skills as opposed to the number on the scale.

Examples

The following are examples of bird training that have been successfully implemented that do not use weight management as a means of creating or determining motivation.

Free Flighted Flock of Cockatoos

Chris Shank of Cockatoo Downs maintains a flock of small cockatoos. Some of the flock members are parent raised and some are hand raised. The birds live in large outdoor aviaries attached to a barn. Chris has had many training sessions with some individuals in the flock and the birds have history of receiving sunflower seeds or pine nuts from her if cued for behavior. The birds have access to food in their cages at all times. The birds are also released almost daily and free fly on the property throughout the day. The birds forage on grass shoots and fruiting trees. The ones with training history will recall to Chris reliably when cued and participate in training sessions. In the afternoon, they return to the aviaries where a fresh diet is waiting. There is an important difference in this training setting compared to bird shows that involve very short, predictable patterned flights or behaviors. The birds can and do spend considerable amounts of time in the environment and their behavior, in particular the recall, is extremely generalized with a long history of reinforcement under many conditions. This strategy, combined with management of preferred reinforcers, allows these birds to feed ad libitum and still have motivation to present behavior. See video example: http://www.youtube.com/watch?v=HGF_KDV1kpY

Wild Pigeons

Wild pigeons are fed on a daily basis around 2 PM in a park. The pigeons receive preferred food items from several individuals in the park. Individual pigeons are recognizable by the people who feed the birds. The author visited the park and was able to train several birds to present a variety of behaviors in a short time using preferred reinforcers. Two of the pigeons were hand raised and released by one of the individuals who visits the park. Although usually associated with the flock, these pigeons often fly directly to him upon sight and will follow him back to his apartment.

Being wild pigeons they are free to leave or forage elsewhere. However the easily acquired preferred food items keep them returning on a daily basis.
See video example: http://www.youtube.com/watch?v=t5gGBI6OhkY

Ravens and Keas in Research Setting

Ravens and keas utilized in cognition studies at the University of Vienna in Austria are fed preferred food items when participating in experiments. The keas are fed a base diet of items which include fruits, vegetables, and proteins (varying daily e.g. yogurt and topfen, corn, eggs or mashed meat) three times a day. Training for research projects is conducted in between mealtimes in the morning and the afternoon. The ravens are fed a base diet in the morning prior to training for research projects. They receive nuts, cheese, and dog food throughout the day for participating in the research study. They are then fed the rest of their base diet at the end of the day. Birds are weighed occasionally to monitor health as opposed to measuring weight for motivation for training. (31)

Free Flying Parrots, Cranes and Hornbill

Pscittacines, crowned cranes, and a ground hornbill are free flown successfully without the use of weight management at Avian Behavior International. Animals receive portions of their diet throughout the day, and are reinforced with preferred food items, and nonfood reinforcers. Similar to the example at Cockatoo Downs, the birds are trained to generalize behaviors under a variety of conditions and environments. Animals are free to explore the environment, but are motivated to respond to cued behavior when the opportunity presents itself. Motivation for training is based on behavioral responses and weights are only measured to monitor health. (32)
See video examples http://www.youtube.com/watch?v=KUhloUa6VT0 and http://www.youtube.com/watch?v=49pF_LXpenI

Free Flying Caracara in Zoo

A striated caracara at ZSL London zoo was trained during the non-show season when on feed up. Trainers found the bird would present behavior even though it was 200g over its target weight. They utilized strategies such as only having the bird participate in educational presentations three days a week, managing food, and using nonfood reinforcers such as novel enrichment and caching opportunities. (33)

Macaw Flock in Zoo

A flock of eight scarlet macaws at the Dallas World Aquarium was trained by the author to present a flock flight several times a day without the use of weight management. The birds received a portion of their base diet which included pellets and fruits and vegetables in the morning. Approximately 1 to 2 hours later they participated in a training session in which flight behaviors were reinforced with seeds and nuts. They were then offered free access to their base diet and allowed to feed until satiated. Leftovers were removed and a second training session occurred later in the day. At the end of the day they were again allowed free access to their base diet for several hours. When the birds had gone to roost any left-over food was removed. Birds were weighed periodically to monitor health but were not weighed to identify a target weight for training or measure motivation.

Free Roaming Parrot in Conservation Project

Sirocco the kakapo is an imprinted endangered parrot that lives freely on a 310 hectare island in New Zealand. Sirocco is free to consume normal vegetation available on the island at all

times. Training Sirocco required rangers to track him using a telemetry device as he could be anywhere on the island. Once roughly located, rangers would wait on the pathway for Sirocco to approach. Sirocco's affinity for people and their history of being associated with desired consequences resulted in Sirocco seeking out the rangers once he heard their voices. Sirocco would participate in training sessions for as long as two hours working primarily for small preferred food items not available in the environment and social interaction. (34) See video example: http://www.youtube.com/watch?v=9rgs72JIdx4

Exhibit Harpy Eagle in Zoo

A harpy eagle at the Dallas Zoo was trained without the use of weight management. Initial training began from outside of the enclosure. The bird was trained to target, and fly from point A to point B for keeper presentations inside the exhibit. The bird was also trained to shift into its cold weather holding area and also to enter a crate. The bird was trained to get on a scale although this was used to monitor health, not motivation. Interest in food was evaluated by looking at behavioral response. The bird was also trained to allow touch to the chest and legs, the application of removable anklets and jesses, and to hop to a glove. (35) See video example: http://www.youtube.com/watch?v=IeP1CBrkJtc

There is much more to explore and discuss about the ways people are successfully training birds in free flight/free roaming and enclosed settings without the use of weight management. Of particular interest would be to explore the application of different strategies with a wide range of species. Bird collections often present a great diversity in avian natural history and some strategies may prove to more successful with some species than others. Only a few examples have been shared here, however it is hoped that more trainers will document and share their strategies to facilitate continued advances in bird training.

Conclusion

Training birds involves the use of many different strategies to influence motivation. Skilled trainers are drawing upon all of those tools (reinforcement history, schedules of reinforcement, variety in reinforcers, awareness of environment and its effect on behavior, food management, etc.) Weight management for many has been a part of this toolbox. In some cases it has been the primary tool. However when scrutinized, weight management presents questions about welfare.

More and more people are demonstrating that birds can be trained without micromanaging diets and weights. Their successes open the door to strategies that allow reaching behavior goals and at the same time attending to high standards of animal welfare. These revelations suggest perhaps it is time to stop putting so much weight on the scale.

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Caloric Restriction for Longevity: II—The Systematic Neglect of Behavioural and Psychological Outcomes in Animal Research Kelly M. Vitousek1*,y, Frederic P. Manke1,Jennifer A. Gray1and Maren N. Vitousek21University of Hawaii, USA2Princeton University, USA

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Ready...Set...For Groomer and Vet

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Training in aquarium and zoological programs includes proactive and positive shaping plans toward voluntary husbandry care. In established programs, this goal can be achieved through trainer consistency, set schedules and sessions, a closely monitored and healthy diet, and detailed record-keeping that lends itself to effective planning. But how do you achieve similar goals when working with the average pet owner and his or her dog?

In 2010, we launched our Ready…Set…for Groomer and Vet! program at Furnetic, part of the Chicago Center for Veterinary Medicine and University of Illinois College of Veterinary Medicine. The objective of this program is to show trainers, pet owners and veterinary students how to train husbandry behaviors while working on other goals. When clients and veterinary students see that a "Happy Vet Visit" can be painless and completed within a short time interval, they are empowered to carry the games to their own veterinary office. Most owners see the value of this strategy when small successes lead to larger progress over time, in this case at each subsequent veterinary visit.

In the Ready…Set…for Groomer and Vet! program, training is practiced in short, frequent sessions and integrates husbandry goals with various other behaviors. These sessions increase the dog's comfort level with husbandry procedures and have led to successful voluntary blood draws, nail trims and wellness exams with dogs at various ages.

This collaboration highlights the importance of positive training with a community-based approach while empowering owners to be at the heart of their dog's daily care.

Successful Reintroduction of a Beluga Whale and Calf Based On Observational Learning, Surrogate Rearing and Husbandry Training Techniques

Steven M. Aibel and Mark Galan
SeaWorld San Antonio

In the summer of 2013, 1.1 beluga whale (Delphinapterus leucas) calves were born at SeaWorld San Antonio. The first calf, a male, was born July 9, 2013. The cow did not exhibit any maternal response such as nursing, paired swimming, or contact toward the calf. This calf was initially hand-reared and paired with another adult female to provide socialization and potentially to nurse the calf. The second calf, a female, was born July 26, 2013 to a more experienced cow. This cow had successfully raised two calves previously. During this birth, the first cow was present in the birthing pool. This allowed her to observe the birth and initial bonding from an experienced cow. It was hoped through observing normal cow-calf behavior the first cow would learn observationally to care for her calf upon reintroduction. After 3 days of observing normal maternal behavior and rearing, the first cow was reintroduced to her calf and started to care for him. Three primary factors led to a successful reintroduction: exposing the less experienced cow to a more experienced cow during the birth and initial bonding of a calf, maintaining lactation in the first cow, and exposing the calf to a surrogate for socialization. While maternal cow and calf behavior in cetaceans may be innately influenced, maternal experience and offspring response are critical as well. Paired swimming, nursing, and regular maternal behavior have been sustained and this reintroduction has been successful.

Rehoming the Outcast Parrot- Training, Patience, and a Big Heart

Michelle McClelland
Wings of Love Bird Haven, Inc.

In the animal rescue world, the focus is to rehome. This usually allows for the more "social" animals to be chosen first, leaving the others to wait longer and have more chances to exhibit behavioral problems. When interested adopters look for a new parrot, many people want the perfect bird. In the parrot rescue world, the idea of perfection is not always possible. Companion parrots can sometimes go through many owners due to age, health or behavior problems. Through a weekly positive reinforcement training program at the Haven, the "outcast" parrots were taught basic behaviors through shaping and three out of five birds have found their forever homes in the past year. By teaching simple, basic behaviors, these birds have begun to blossom. A small lift of a foot, taking a reward out of your hand, turning away in a full circle, or not lunging when a hand is presented, can take months to accomplish, but can mean milestones for that particular animal. Many live in fear and have various anxieties to certain situations. Positive associations can now be paired with past anxieties. These small training goals have made these animals more presentable and thus more adoptable. The wallflowers are now visiting the front of the cage and the biters are now able to offer alternate, acceptable behaviors. Training programs are being developed for future adopters and fellow professionals (that work with any species), allowing any outcast to stand a better chance of adoption.

About a year and a half ago, I set out to create a training program at a local parrot rescue. Out of a room full of parrots, I asked about the problem birds. The parrots that were fearful, tended to bite, lunged at newcomers, or stayed at the back of the cage. I was looking for the outcasts. My goal for this project was to use positive reinforcement based training as a way to make these misunderstood parrots a little more adoptable. The group has included two African greys (*Psittacus erithacus*) (Ditto and Sammie), a Goffin cockatoo (*Cacatua goffiniana*) (Boogie), an Amazon (*Amazona)* (JuJu), and a Blue & Gold Macaw (*Ara ararauna*) (Chico) so far. Since the training has begun, three of the outcasts have been adopted. Each week, I volunteer a few hours on Saturday morning and train about five parrots.

There are three things I focus on when working with the outcasts: trust, training and a big heart. It all boils down to creating a good relationship with these parrots in a limited amount of time. Many come from multiple homes before they enter the Haven and have trust issues. My intent is to create positive associations with the knowledge that they might get adopted at any time. The may not all step up by the time they go to a new home, but they'll have the framework of what it might take to get there.



Trust is always in the back of my mind with each outcast. Sammie, the first outcast I trained, showed me that you cannot jump into training without preparation. The second I put my hand on his cage, he lunged and bit down on my finger. We had not worked on relationship or trust, and he let me know quickly. I work on their terms. I give them as much space as needed and work at their speed and comfort level. In doing this, I create realistic goals and I am always fine with walking away. If they're not up for training, I come back later. I always document and observe when certain



birds do not want to work. Trust is always built on a strong history of observation, which requires a good amount of time and patience. Observation is a very important component of the training process. I watch for anything that can be used to build a positive relationship. Everything from the reaction to novel things or people, to the preferred foot or food is documented and then reviewed.

When I begin training, I use the information that I gained from observing to determine the reinforcement for our sessions. I look for ways to deliver the reinforcement (spoon, hand, etc.), what type of reinforcement can be used, and what kind of rate of reinforcement will be available per the type of reinforcement. I have been fortunate that each one of the outcasts have enjoyed pine nuts as their favorite training treat. I try to break up the nuts into two or three pieces to allow for more chances of reinforcement, without the worry of adding more nuts to their diet.

Everything is documented, from observations to the cue for the end behavior. I write down the session time and duration (usually stay between 5-10 minutes), what behaviors were worked on, any cues that were added, and what distractions were present. Documentation is very important to not only show progress, but to allow directors and other volunteers a chance to read what we are working on. This information can also be used in the future to help with similar behavior issues.

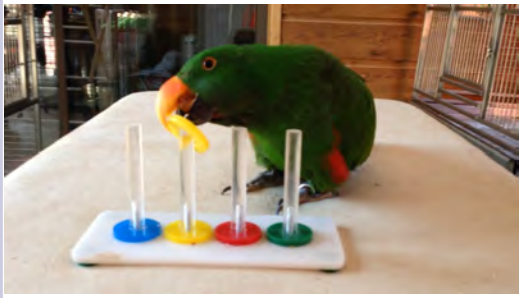
Each session is a little different, since each outcast is different. Since many of the outcast parrots have issues with trust, hands, and new things, I tried to capture and free shape behaviors. This allows them to offer behavior and be in control of their environment. Since many potential owners want their birds to step up, I capture foot. In doing this, the parrot has the chance to lift a foot a few centimeters above the perch. I then gradually introduce a perch through the cage, ask for the foot behavior, and then wait for the foot to get close enough to the perch to reward. No force or coercion is used. It is their choice to perform the behavior.

I also have worked on head dips. I shaped slow downward movements of the head and then gradually introduced my finger in close proximity to the cage. I observe body language to gauge how close to put my finger. Over time, I open the cage door, ask for a head dip and present my finger, just as I did with the closed door. In small proximities, I was successfully able to touch the head of a very shy and timid African grey that would always sit on his swing in the back of his cage before training sessions began. Targeting is also used with the parrots that resort to lunging and biting. They are shaped to lessen the harshness of the bite to the target stick. Then they are asked to target in various places of the cage. This allows others to successfully open doors or remove and replace dishes without the fear of attack.

Sessions are short. I usually try to keep them under ten minutes and have seen better results recently with five minute increments. Protected contact is also utilized until enough trust is built up. This is not only for the safety of the trainer, but also the parrots since they are in a room with twenty other animals. Although these are companion parrots and we hope they have a lot of outside the cage time when they are adopted, a lot of progress and impulse control can be gained from doing training sessions inside the cage.

My main goal with all of the outcast parrots is to build confidence. It doesn't matter how far we get with a particular behavior, I always try to make as many positive associations with

them as possible. Since many were told no in previous situations, I try to find any opportunity to let them know they're doing a good job with their progress. Chico, the macaw, likes to lunge and escape out of his food dish door when volunteers try to feed him. We have been working on teaching an alternative behavior of lifting his foot and saying hello when the food door is open. I call it the parrot zen or leave it behavior (similar to dog training exercises). I open the door to his food dish, place a nut in the bowl, and walk away a few steps. He then lifts his foot and says hello and I slide the food dish back into the cage to deliver the nut. That behavior has been a true test of impulse control. Ditto, the shy African Grey that was unsure of people, allowed me to scratch his head over time. He then allowed his potential adopter to scratch his head before he was sent to his new home. Bridging behaviors so multiple people can ask for them is very important in the rescue world. It was discovered that Sammie, the African Grey that liked to bite, enjoyed time out of his cage. He was allowed time to sit on his cage door for a few minutes each session and then was reinforced for going back into the cage. His biting tendency lessened when I discovered that he wanted out of the cage and created a plan to allow safe play time and opportunities for him to go back in. Each time I asked him to return to his cage did not always mean he was going back in for the rest of the day, it was completely random, and he enjoyed the game.





Success in training could not be achieved without having a big heart. It has taken a lot of patience and commitment to see progress in the outcasts, but it is a great experience to see these parrots blossom into more confident individuals. This positive achievement has lead to the planning of exciting education programs within the community. Some of the director's resident birds are being trained to perform various tricks to be used at education and community events. Not only do we want to create classes and educational events for bird owners, but we also want to show that training within a rescue can be successful across species. Parrot training for dog trainers is the next venture, along with many more plans to help other outcasts blossom.

Investigating Intriguing Incentives for Iguanas

Jennifer J. Elston, Ph.D.
Fort Worth Zoo

Enrichment provides a valuable means to enable and encourage the performance of natural behaviors by animals in zoos. Studies have shown that effective enrichment can enhance animal well-being by offering mental stimulation and promoting activity. However, studies evaluating enrichment for reptiles, particularly lizards, are limited. The Fort Worth Zoo in Fort Worth, Texas, houses a variety of lizard species, including several species of iguanas. The effects of novel enrichments on iguana exploratory behavior (Cyclura spp., n=9) and the extent of their interactions with novel foods, objects and scents were evaluated. Data were collected over 24 days during three phases (baseline behavior before novel enrichments were offered, presentation of novel enrichments, baseline behavior after the enrichment phase) for comparison. Iguana behavior was recorded via Scan Sampling with each iguana's behavior recorded every minute for 40 minutes. Novel enrichments were presented on separate days and included raspberries, a clear plastic ball and a fresh herb (basil). Then, enrichments were combined with additional novelties to encourage the iguanas to increase their interaction time with enrichment. The combined enrichments included raspberries on an elevated scoop, a clear plastic ball combined with red cotton balls soaked in coconut extract, and fresh basil in and around a grocery-sized paper sack. Iguana interactions with enrichments are described and indicate novelty can play a role in encouraging exploratory behavior in iguanas.

You Can Teach an Old Dog New Tricks: Managing a Pair of Geriatric Asiatic Wild Dogs Carrying Behavioral Baggage

Sarah Stata
Toronto Zoo

The Toronto Zoo is one of four institutions in North America that house the Asiatic Wild Dog (Dhole), a species known for their strong family bonds and pack like mentality. In our Eurasia section of the zoo we house 0.2 Dhole that are 13 years of age. These animals have received minimal training opportunities in the past due to housing and breeding constraints. Any medical procedures that have taken place involved an aversive catch up routine in their primary holding, which has built a negative association with their holding pens and inconsistencies in shifting behaviors. The zookeepers and support staff service their exhibit with the animals present, causing unnecessary stress on the staff and animals. As a new trainer I started working with the Dhole in November 2012. It wasn't until I started working with these animals that I truly appreciated and understood the importance of shifting, consistency in training and the benefits of enrichment programs. By incorporating an enrichment schedule, consistency in training staff, modification of diet and multiple training sessions daily these animals have shown a drastic change in behavior. The training challenges we have had to overcome include: construction setbacks, seasonal changes affecting appetite and motivation, dominance between the pair and holding design. Despite these challenges, the Dhole are performing behaviours with such ease and confidence the keeping staff is amazed at what these two have accomplished.

Jet the Skunk:
How Giving an Animal More Control of Their Environment Can make all the Difference

Elizabeth Kinsala
Six Flags Discovery Kingdom

*"Jet", a 3 year old striped skunk (*Mephitis mephitis*), at the Wildlife Department, was having trouble completing a remote routine for the Wildlife Education Show. Jet had been hand-reared and was quite comfortable with his trainers. However, when it came to his routine for the show, he was having difficulties completing the task. Initially, trainers would start him towards the end of the desired pattern in attempt to back train the routine. Jet would react adversely to the audience, as well as subtle changes backstage, causing him to forgo his routine and run off stage. Recognizing the behavior was quickly digressing, giving Jet more control of his environment seemed to be a potential solution. We were able to establish a familiar, safe place for Jet to finish the routine by incorporating a voluntary crate behavior, while using operant conditioning. We allowed Jet to further control his environment by training him to close his own crate door. Now, not only does he have a completed show routine but he is much more comfortable on stage; taking time to complete the behavior at a calm, comfortable pace, with a full audience. Providing Jet with more control of his training and environment allowed him to become the confident skunk he is now.*

The Wildlife Department at Six Flags Discovery Kingdom in Northern California offers educational animal interactions, giraffe feeds and scripted shows to the park's guests. At this facility 26 species of 45 individual animals consisting of mammals, birds and reptiles are housed.

Two of these individuals include Jet and Ace, 4 year old striped skunks (*Mephitis mephitis).* These two had come to the park at 8 weeks old and were hand reared by the trainers at Wildlife. I was assigned to work on the skunks' crate behaviors as well as Jet's show routine. Jet had been having some difficulty completing this behavior; he seemed to be reacting adversely to the audience as well as to subtle changes backstage, causing him to run off stage or around backstage. It was clear this behavior was quickly digressing but it was unclear as to what needed to change. We couldn't pinpoint what was causing Jet to become uncomfortable during the shows so it was very difficult attempting to fix the problem. Somehow the entire situation had become negative and needed to be reworked but we were stuck. How could we fix this, what could we change? Then an idea came about, what if we gave Jet more "choice" in his training? Therefore, we decided to give Jet more control in his training sessions to see if this would help. But what kind of control could we give him?

In order to provide Jet with some control, the crate was added to the routine which would allow Jet to have a familiar, safe place to run to after completing his show behavior. To maintain this safe place for Jet, a few crate rules were made: 1) Jet would never be put into the crate; he needs to walk into it on his own, and 2) he would never be pulled out of the crate. Basically, Jet would be able to choose if he wanted to participate in a session or not, hence giving him more control.

We started training the crate behavior with just the bottom of the crate using operant conditioning. Jet would be targeted into it and when he was ready, the top and the door were added. Once we added the door, an idea popped into my head. I remembered that the Sea Lion department at the park had trained their otters to shut their own crate door. I thought that if we could train Jet to shut the crate door, on his own, that might be the control he needed. By doing this we could give Jet the opportunity to decide if he wanted to be locked in the crate or not. So another crate rule was made; Jet would only be locked in the crate if he made the decision to

close the door.

Training this behavior turned out to be much easier than anticipated. We started by holding the crate door just enough for him to get through. I would bridge and reinforce inside the crate and then I would hold a piece of food up enticing him to touch the door. If he did touch the door I would bridge and reinforce, eventually capturing the behavior. I then waited to reinforce until he pulled the door. The next step was fading out the reinforcement for going into his crate; we wanted him to go into the crate and pull the door as a single behavior. After this was established we took small approximations of slowly opening the door until it was all the way open (about a 90 degree angle) so Jet had to reach out and pull the door closed.

Next we worked on the show routine which is a remote A to B. We kept the end point of the original routine. His A to B routine is a semi-circle on stage. He leaves his crate back stage, entering from stage left, moving around a few objects and exiting stage right through a hole in a piece of drift wood where his crate and trainer are waiting. The show routine was started from scratch. We also made the crate and the routine behaviors two different opportunities for reinforcement. If Jet did the behavior correctly he received reinforcement in front of the open crate and then received another when he went in and shut his door. This way the crate would always be positive.

The A to B routine was back trained and started with Jet being placed right in front of the hole in the drift wood. As Jet made progress he was slowly moved further and further away. The crate and the act of shutting it seemed to make all the difference for Jet. If he ever got nervous back stage during training (or the show) he would simply go into his crate. A few times he even picked up his reinforcement for the routine and went into his crate to eat it before shutting the door if he needed that security. He was doing great until he reached the objects he had to run around. Jet, being the cleaver guy that he is, decided he would forgo running around the objects and just cut straight across stage to his crate. We had to scavenge for crates and other things I could use to make a wall for him to rehearse his actual routine. We also placed two pieces of food along his path in order to reinforce him for going around the objects. We decided to keep those as part of his routine rather than fade them out to keep him on stage longer, due to the fact that once Jet figured out what we wanted, he ran the behavior a bit too quickly. Once all the kinks were figured out we added people sitting in the stands during training and had them move around to simulate an audience. The first time we put the finished behavior in the show Jet ran it perfectly.

Like any behavior being trained, there were a few times we had to troubleshoot. That being said, Jet seemed to remain interested in sessions and shows while troubleshooting was being done. He never really seemed to get too flustered to continue. Jet had become very confident and this was clear during the shows especially when he made mistakes. For example, there was a point when a little too much cat food had been dropped during a previous animal's behavior. This proved to be too tempting for Jet and he continued to look for fallen cat food instead of completing his routine. Even though Jet was rehearsing behavior we did not want, the fact that he was comfortable enough during a show, with a full audience, to forage for food was a welcomed observation. During one show Jet had taken far too long to work through the distraction on his own and it was clear he had become completely focused on foraging. I needed to go out on stage and get him. I started walking toward the area on stage where we kept a target pole so I could try to target him offstage. To our surprise before I even reached the target pole, Jet saw me and came straight to me. He followed me off stage without any hesitation and shut his crate door without issue. This showed us how comfortable with the routine and the trainers Jet had become. It seemed that Jet's confidence and trust had greatly started to outweigh the previous negative associations he had with the behavior.

This concept of closing the crate door has since been used for other animals in the Wildlife

Department. Our three White-nosed Coatis are now in the middle of being trained to close their crate door and one of the red foxes overcame his fear of the crate by being trained to close his own crate door using a rope. The rope is no longer needed and he will go into the crate and sit while a trainer closes the door. Furthermore, Ace our other striped skunk, has also learned the behavior and participates in shows alongside his brother. He now runs into a hole in the fence with a crate door attached to it.

In conclusion, thinking outside the box and changing one aspect of a behavior can change an animal's entire perception of a situation. Not only does giving the animal a choice to participate build trust between the animal and the trainer but it also builds confidence within the animal. Choice can make an entire experience positive, and sometimes, choice is all the animal needs.

What about Boise? Adjusting Training Techniques for Success with a Naive Gray Wolf (*Canis lupus*

Megan Glosson, Cassy Landon, and Jay Tacey
Busch Gardens Williamsburg

Socializing captive animals to humans can improve their welfare (Hosey, Melfi and Pankhurst, 2009). Thus, animals unsocialized to humans are likely at a disadvantage and their ability to be fully engaged in existing social structures and education programs is often limited. In June 2012 at Busch Gardens Williamsburg (BGW), an existing education program consisting of hand-reared, human-socialized Gray Wolves (Canis lupus) acquired Boise, a wild-born wolf pup, unsocialized to humans. This made the use of techniques previously successful with the socialized population challenging. Most effective for Boise was coupling the use of operant conditioning, the primary form of behavior modification used at BGW, with systematic desensitization and observational learning, including social facilitation and stimulus enhancement. Trainers have successfully integrated Boise into a pack of socialized wolves and conditioned him to voluntarily participate in some of the existing presentation and husbandry behaviors. Trainers now observe decreased pacing, reactivity and flight responses. It has increased healthy intra-pack dynamics, and his ability to be on exhibit, thus increasing time spent with his pack and reducing time alone. This outcome suggests that animals not socialized to humans can be effectively acclimatized into an existing program and that effective training strategies may differ depending on levels of socialization. Implementing these techniques may lead to an improved quality of life for the animal, facilitate resource management for facilities, and increase opportunities for conservation education. This holds importance for captive and wild populations.

Background

The Wolf Haven area at Busch Gardens (BGW) in Williamsburg, Virginia houses 7.1 Gray Wolves (*Canis lupus*) ranging in age from 2 to 14 years. The area is geared towards conservation of a keystone species, as wolves are often maligned and misunderstood by the general public, yet play an integral role in maintaining healthy ecosystems. Acting as ambassadors for their species, the wolves in the BGW collection participate in an educational presentation, The Secret Life of Predators, a limited attendance training tour, The Wolf Training Up Close Tour, and they are also viewable on an exhibit, Wolf Valley.

Since its inception in 2000, the wolves in Wolf Haven's collection have been born in captivity and hand-reared. Gray Wolves' physical and social development begins at a younger age than domestic dogs (Klinghammer and Goodmann, 1985). Without this socialization and exposure to humans within the first 21 days of life, wolves maintain their natural fear of humans (Joslin and Mallonee, 2004). Therefore, pups selected to live at BGW are exposed to humans prior to 3 weeks of age. This process facilitates training and has also reduced stereotypic and fear-based behavior in the wolves towards trainers and guests, both as pups and later in life as adults.

Additionally, they are introduced to a surrogate domestic canine whose function is to teach them social cues, maintain a dominant role to mimic pack social dynamic, and display desirable responses to novel stimuli. While living with the dog they begin learning basic behaviors through classical conditioning and positive reinforcement (R+). All behaviors are voluntary and most are conditioned and achievable under stimulus control. Shaping and capturing are the

most commonly used methods, although under certain conditions, trainers have had success combining these techniques with desensitization. By utilizing these methods, trainers have maintained safe, positive working relationships and observe healthy intra-species pack behavior amongst the wolves.

Prior to 2012, all acquired pups underwent the aforementioned human-socialization process. However, in June of that year, 1.0 Boise arrived. Boise was wild-born and had no human contact prior to approximately 7 to 8 weeks of age. At that time he was picked up by campers outside of Ketchum, Idaho, after being mistaken for a lost dog puppy. He was malnourished and dehydrated when found and sent to Zoo Boise for rehabilitation, though they were not in a position to house him permanently. Idaho Fish and Game and Defenders of Wildlife chose BGW as a suitable permanent home for Boise. This was largely based on a history of successful Gray Wolf management and the recent acquisition of 1.1 human-socialized pups of similar age who could potentially be pack mates with Boise.

Description of Presenting Problem

Gray Wolves have an innate instinct to identify and avoid unfamiliar stimuli (Klinghammer and Goodmann, 1985). While this instinct is necessary for survival in the wild, it is counter-productive to the goals at Wolf Haven, where the wolves will be living in an environment where they are exposed to unfamiliar guests and stimuli on a regular basis. In the past, wolves that were not socialized or habituated to humans, but were housed in similar facilities, have displayed signs of stress and stereotypic behaviors (Joslin and Mallonee, 2004; Klinghammer and Goodmann, 1985). In comparison, socializing wolf pups at an early age has shown reduced fear responses towards regular stimuli and fewer displays of aggression and fear towards humans, according to Klinghammer and Goodmann (as cited in Sherratt-Ayerst, n.d).

Given that Boise was not afforded this type of socialization, his behavior upon arriving at BGW was vastly different than that of the existing collection. He was significantly more reactive to most stimuli, especially people. Hyper-vigilance, avoidance behavior and extreme startle responses were frequent. The two socialized pups being raised under the same conditions were not displaying the intense levels of reactivity seen in Boise. This indicates that he was likely affected more so by his lack of human socialization, than other factors. This put him at a disadvantage given the previously mentioned high-stimulus environment.

Specific undesirable behavior observed in Boise prior to initiating a training plan included: a long, easily triggered flight distance, fast running or pacing when a perceived threat was presented, sudden defecation, and fence chewing and climbing. Given the quick presentation of these behaviors, trainers began implementing R+ training within days of Boise's arrival to help reduce the frequency, intensity and duration of the behaviors. Boise responded moderately to standard R+ techniques, which did help create a positive association with trainers. Although the apparent fear-based reactions were intermittently subsiding to a small extent with trainers, they were still relatively pronounced given any other sudden stimuli or change to the environment. This was not ideal, as the ultimate goal was Boise's long-term comfort and cooperative management, similar to that of the other wolves.

Another recurring concern that arose during training was Boise's inability to progress through a learning plateau. During the initial training of several behaviors, he reached a point where he would not advance to the next approximation, regardless of approximation topography or speed of progression. In some instances he regressed without rebounding to previously estab-

lished criteria. This was also not ideal, as offering Boise a wide variety of socially, mentally and physically enriching experiences was dependent on his voluntary participation.

Without the ability to efficiently and reliably respond to training and consistently emit correct responses, his possibilities would be severely limited. Over the course of the first few months, he was already afforded less time with his pack mates, as they would all gate to other habitats, including the exhibit, and Boise would not. His ability to be an effective ambassador for his species was also limited, as he refused opportunities to be in front of the public. Given his low level of participation, trainers were also concerned that in the future, his husbandry and free-contact training sessions (the primary form of mental stimulation provided to the wolves) would also be impacted. In short, if Boise could not be trained to a level similar to that of the other wolves, he, the team and the program would be at a serious disadvantage. That was not an acceptable outcome.

This meant the standard approach used previously with the human-socialized wolves would need to be tailored to Boise's needs as an unsocialized animal. Trainers began to compare Boise's responses to various behaviors. A common pattern emerged when training new behaviors: those eliciting apparent fear-based reactions were not progressing, while those that did not appear to be aversive progressed almost on par with the training of the socialized pups. Furthermore, Boise was much more likely to participate and succeed when pack mates were also participating and succeeding, regardless of the intrinsic value of the stimulus (reinforcing, neutral or aversive).

Comparison of Behavioral Techniques

As previously discussed, BGW's existing program uses R+ to reinforce correct responses. To address incorrect responses trainers most frequently respond with a least-reinforcing scenario (LRS), whereby a neutral response is given for several seconds. Following the LRS, the animals are most often given a second opportunity to complete the behavior, or trainers move on, requesting other behaviors. When an LRS is ineffective, trainers remove the opportunity for reinforcement temporarily by suspending the session. This enables trainers to re-approach the session later, and if necessary, set the animals up for more success by modifying what is asked of them if the initial criterion was not realistic. It also gives trainers the opportunity to reinforce only correct behavior, not the series of incorrect responses already emitted during the initial session. Differential Reinforcement of Incompatible Behavior (DRI) and Differential Reinforcement of Other Behavior (DRO) have also proven to be effective non-correction based techniques. When aversive stimuli or fear-based reactions by the wolves were observed, trainers often had success alleviating or reducing these reactions using systematic desensitization and counter-conditioning.

During Boise's initial training, these same methods were attempted. However, Boise lacked a positive reinforcement history with humans. The socialized pups appeared to find trainer presence reinforcing without any behavior modification, and would readily approach trainers; this was not the case for Boise. Trainers often had to initiate interactions using systematic desensitization and baiting. Repeated sessions of classical conditioning using primary reinforcement was required, but eventually allowed Boise to habituate to trainer presence, leading to more opportunities for operant conditioning.

The behaviors trained first were those of highest priority to enable future, more complex training. These included: a bridging stimulus, name recognition, a hand touch target, cooperative group feeding under stimulus control (hereinafter referred to as control), coming to the trainer when called, and taking a cue to leave one trainer and go to another (hereinafter referred to as tar-

geting). These behaviors were trained to the group of pups over the course of approximately 2 months while the surrogate dog was still present. Although Boise's response time was usually more latent than the socialized pups, he would generally meet minimum criteria if the pups, the dog, or both were present. However, when asked to complete the same behaviors alone, his success rate dropped significantly. Based on previous experience training socialized pups, trainers considered Boise's progress to be only moderately successful.

Although trainers would have preferred to see stronger responses prior to initiating more complex behaviors, time constraints deemed it necessary to advance. In order to safely and effectively add the pups to an established adult pack for their long-term social benefit, trainers preferred to begin their introductions prior to 6 months of age. This meant that trainers needed to establish foundation behaviors that would make this possible. These behaviors included holding under stimulus control as pack mates separated from the group, gating with pack mates, and reliably entering and remaining in less familiar habitats for extended periods of time. It should be noted that trainers were not able to do any desensitization involving gates or other habitats prior to August, as quarantine procedures required that the pups be sequestered in a single habitat.

The addition of these more complex behaviors made it clear that Boise was not improving with more time and rehearsal. This was when trainers saw the greatest decline in success when using shaping, as he would not advance through approximations. When attempting to capture the same behaviors as an alternate method, latency and discrimination were persistent setbacks.

An example of this was his learning to shift through gates from one habitat to another. The original training program attempted was that which was successful in the past, starting with systematic desensitization. Boise was called to control with the other pups for the opening of the gates, but was not asked to go through them. After they were opened, trainers released them from control (hereinafter referred to as stepping up), allowing the pups to explore at their own pace.

Once they were observed moving freely through the gates and remaining in the unfamiliar habitat comfortably, trainers began asking them to move through the gates under stimulus control. This involved a sending and receiving trainer, both of whom were equipped with primary reinforcement. The sending trainer would target the pups to the receiving trainer. Approximations started with trainers relatively close to one another and progressed by lengthening the distance between them. Historically, this was to reduce the likelihood that the pups would get confused or distracted. It also served to strengthen the reinforcement history of maintaining stimulus control between trainers while moving through changing environments. These functions met the needs of the two socialized pups, but in Boise's case, these approximations were additionally necessary to counter-condition fear-based reactions to the gates themselves. It was at this stage of increasing distance that Boise plateaued. Regardless of antecedent arrangement, he routinely refused to gate, even if the other pups had completed the behavior and left him behind.

Because trainers had observed Boise comfortably move through the gates during the desensitization stage, the decision was made to revert to this step, rather than to continue allowing him to rehearse refusals. This meant that trainers would have to attempt capturing the behavior. The first obvious hurdle was Boise's discrimination between the presence and absence of trainers. When trainers remained in the vicinity, he would display considerable approach/avoidance conflict, often stalling at the gate followed by a startle response. However, when trainers would open the gates and walk away from the area, he would move between habitats freely. This made criteria vague, as trainers inconsistently had to revert to walking away. This presented several problems: 1.) immediacy of reinforcement for the actual act of gating was severely delayed; 2.) his level of discrimination against trainers increased, as he was being secondarily reinforced for waiting for

trainers to leave. Given that trainers needed him to gate under stimulus control in their presence, this was counter-productive to the goal.

To combat discrimination and improve the accuracy of reinforcement, trainers quickly determined that criteria needed to be tightened and must involve their presence. This meant trainers had to stay in position at the destination habitat waiting for Boise to gate. Maintaining this criterion was not sustainable long-term, as Boise's response was unreasonably latent, sometimes taking up to 2 hours, with little improvement after several weeks. Although theoretically this time could be gradually reduced, it was not practical given the constraints of the area. Similar challenges to those detailed in the gating example were evident in other in-progress behaviors, even after Boise had been introduced to and accepted by an established adult pack. This lack of progress made it clear that an adjustment in training techniques would be necessary for Boise's prolonged success.

Another interesting observation during this period was Boise's propensity for engaging in behaviors with pack mates outside of the context of stimulus control. Behaviors in which Boise would not engage during sessions, he would readily do when not being actively trained. Unconditioned, naturally occurring high rate behaviors appeared to have a strong influence on the success of low rate behaviors still in the conditioning process because they appeared to be of higher value to Boise than primary reinforcement, and also seemed to serve as a motivating stimulus. These unconditioned behaviors included: social interaction, mimicry of pack behavior, and initiation of play behavior with conspecifics, trainers, and inanimate objects in the presence of trainers. These behaviors seemed to motivate Boise, but typically after he had already refused a behavior and we had stepped up.

An example of this was shifting to the exhibit. If he refused to go all the way out to the exhibit under stimulus control, we stepped up, leaving the entire pack with access to the exhibit. When the other wolves began to run and play in and out of the exhibit, Boise would join in and mimic that play behavior, even running down into the exhibit he had previously refused.

Trainers used these observable preferences emitted by Boise to formulate a new strategy. Using the premack principle, trainers could use these self-reinforcing behaviors as consequences. However, they could also use his pack's behavior to serve as the antecedent, rather than a stimulus provided by the trainer. The other wolves modeling correct responses facilitated observational learning, principally social facilitation and stimulus enhancement. Depending on the nature of the desired behavior and where in the topography Boise had previously been failing, either social facilitation, stimulus enhancement or a combination of the two was most effective.

Social facilitation is when the presence or activity of another animal serves to increase the motivation of a conspecific (Dornhaus, 2007). Examples of social facilitation include group foraging success or an entire group of individuals engaging in a flight response. The individual is motivated to behave as the group is behaving. Stimulus enhancement is when another animal's attention is directed towards a place or object and influenced by a conspecific interacting with that object (Dornhaus, 2007). An example of stimulus enhancement is a primate using tools that a conspecific used to obtain food. The model's interaction with the place or object influences the observer's behavior toward that object. It may increase the observer's likelihood of interacting with that object or decrease it, depending on the outcome that was received by the model.

By setting up observational learning proactively and removing trainer cuing as an antecedent, Boise responded much more readily. Opportunities for accurate, reinforceable moments at full criteria increased. This strengthened reinforcement history for the behavior itself, without prolonged rehearsal of refusals. It also reduced the likelihood for accidental reinforcement of poor

responses by subsequent pack interaction. Only after observational learning produced predictable, consistent responses did trainers reincorporate their presence and the discriminative stimuli as antecedents.

Behaviors that benefited most from social facilitation were those that Boise had performed on occasion, but the success rate was too low for absolute threshold to be measured. This did not provide enough repetitions for primary reinforcement to increase frequency or decrease latency. These behaviors were: gating between back area habitats (as opposed to habitats with guest exposure), spending extended periods of time in Wolf Valley, and eventually, free contact sessions with trainers on the stage during non-operational hours. Boise's success rate in these areas increased dramatically and quickly after abandoning the previous approach of capturing, shaping, or both in favor of social facilitation. This success prompted trainers to use this technique proactively as the primary form of learning for two new behaviors: stationing on stage and calm, natural behavior during a film shoot. This proactive approach yielded more reliable, long-term responses.

The behavior that benefited most from stimulus enhancement had been attempted previously using the old plan, but had never been successful. It was asking Boise to gate across or to, the stage under stimulus control during non-operational hours. The first attempt occurred when Boise was living only with pups. Although they were all participating, he was not learning by observation, likely because the socialized pups were not an effective model. Since they were also learning the behavior at the same time, they did not reliably model the correct response. However, living with adults who knew the behavior made stimulus enhancement a viable option. Boise's opportunity to participate was removed, allowing him to witness the positive non-aversive consequence for the conspecifics' movement to, or across, the stage. After watching them get reinforced on the stage and for crossing the stage, he was motivated to engage at that location when given access. This was especially helpful with regards to the stage, as it appeared to be one of the locations that provoked strong fear-based reactions. Once stimulus enhancement was effective for training the behavior, it was able to be maintained with R+ alone.

Attempting the exact same behavior in the presence of guests, as opposed to the previous example, which occurred when the park was closed, was not as successful using solely stimulus enhancement. When Boise was given the opportunity to watch his pack mates succeed in front of the public, it did not seem to create the same level of motivation as it did when the public was not there. He was not showing signs of eagerness, such as splitting to the gate or approaching the gate and watching them when released from control. Instead he would circle, wander to the back of the habitat or lie down. This led trainers to believe that more systematic desensitization coupled with social facilitation might be needed to catalyze the effects of stimulus enhancement.

When the presence of guests was a factor, trainers found the most success by first using systematic desensitization, giving Boise and his pack mates' access to the stage. If Boise chose to explore the stage with his pack mates, then all were reinforced, using social facilitation. This built a reinforcement history on the stage with guests present. Once Boise was reliably comfortable and choosing to be on stage, trainers were able to put the behavior under stimulus control. His responses were strengthened and maintained by variably using stimulus enhancement (occasionally not asking him to go, but letting him watch his pack instead) and R+. This had a positive impact on Boise's ability to not only gate to the stage, but to stay on the stage comfortably for extended periods of time. This was critical to his long-term goals.

This strategy proved to be the most useful when used proactively to train a voluntary scale behavior. The behavior had not been previously attempted, as a new scale was installed in a new

location. The installation process was within Boise's view and involved loud, odorous welding by a stranger. It was a high traffic location that Boise had previously associated with shifts to guest accessible areas, giving it the potential to elicit a pre-aversive response. The scale itself is raised and made of reflective metal. The plan was to use the same series of systematic desensitization, social facilitation, stimulus enhancement and R+ that was effective for stage work in the presence of guests.

On a non-operational day, Boise was given access to the new scale and the path leading to the scale, which included the stage. This free access served as his initial systematic desensitization. Trainers then fed him and his pack mates on the stage to reinforce him for being in the presence of, but not having an interaction directly with, the scale. Following this social facilitation and resulting DRI, where calm control on stage was incompatible with showing fear-based reactions to the scale, trainers stepped up. The wolves were then left for an hour with continued access to the same spaces. Upon return, trainers approached the scale for the first time with few expectations. Both adult wolves voluntarily stood on the scale without being asked, initiating a session. Trainers began reinforcing them, at which point, Boise approached and earned reinforcement for standing next to the scale. His startle response was minimal and he had no flight response. Trainers were able to reinforce him with multiple feeds and step up.

The next session included a much shorter period of systematic desensitization and social facilitation before trainers approached the scale. When they approached, he put one foot on the scale almost immediately and was reinforced. By the third session, Boise met full criteria, putting all four feet on the scale. After several repetitions of full criteria, trainers stopped periods of systematic desensitization; however, social facilitation was still utilized. Finally, stimulus enhancement enabled Boise to advance to completing the behavior alone, without the need for social facilitation. Given that the stimuli involved (the scale's location, physical attributes and installation process) were all stimuli likely to elicit fear-based reactions by Boise, and that the changes to the environment were intense and sudden, the quick success of this behavior served as a benchmark indicator of the training adjustments' efficacy.

Results and Discussion

In retrospect, adjusting Boise's training plan earlier may have reduced some of his rehearsed refusals and fear-based responses. However, the factors contributing to Boise's plateau were not immediately clear. Had the use of baiting when initiating sessions been terminated at an earlier stage, this would have been more evident. Although baiting did serve to form a positive association with trainers classically, it did not appear to further his operant progress from one session to the next session. After that positive association with trainers had been made, successive approximations were no more successful with baiting than without. Eliminating this practice from sessions enabled trainers to better identify the behaviors in which Boise was readily engaging in operantly, as opposed to just being lured by the bait.

Once this hurdle was overcome, the incorporation of broader methods of learning served to benefit his training overall. Most obviously, his repertoire increased. At the age of 6 months he met criteria for six behaviors, only occurring in back areas. Around 1 year of age Boise could reliably perform 21 behaviors under stimulus control and 16 of those 21 were able to be performed not only on non-operational days, but also in front of guests. Trainers continue to use these methods to train new behaviors in front of guests, new husbandry behaviors, as well as strengthen responsiveness to established behaviors.

An additional observation is the facilitation of other forms of learning not previously effective. This includes using R+ without the presence of conspecifics and contingent observation. Prior to adjusting the training methods, R+ was only effective when Boise was with other wolves. However, now that he has established stronger reinforcement histories in general, he is responsive to R+ without those pack mates present. This is evident with the successful training of a safety recall behavior on the stage. Boise learned to respond to a unique bell stimulus without conspecifics present. This involved using only minimal classical conditioning to preempt an aversive response to the bell, which was not observed. Since no aversive response was observed, R+ was then used exclusively. Boise was meeting criteria for this behavior within four sessions.

Contingent observation was also not effective prior to changing the methods. When Boise was living with the other pups, he would routinely see them exploring in new habitats and the stage, but not being directly reinforced by trainers. This did not seem to have any impact on his motivation to join them. However, after having undergone combinations of learning, contingent observation showed signs of motivating him. This was evident when training him to spend time in Wolf Valley. He was given access to Wolf Valley with his pack and was observed entering and remaining in the exhibit while displaying appropriate play and rest behaviors. This occurred after he observed his pack mates safely occupy the space, but prior to any primary reinforcement by trainers. His success using these forms of learning, when previously not possible, leads trainers to believe that the adjustments to the training impacted his overall ability to learn.

Modifying Boise's training plan has resulted in numerous benefits to him and the program. He shows an increased ability to generalize between novel stimuli and locations, emitting positive or neutral responses. His lack of startle response upon initial presentation of the bell stimulus when training a safety recall was a notable change, given his previous responses to auditory stimuli. Trainers have observed similar calm behavior during non-controlled presentation of auditory stimuli (cars backfiring, construction machinery, pressure washing, etc.). Similarly, training him to be comfortable in the presence of film equipment near the stage area seemed to expedite his comfort level with similar equipment near Wolf Valley, but without any associated training in that location.

The ability to generalize has increased Boise's propensity for coping with a wide variety of stimuli previously known to be aversive. Boise now shows fewer stress-related responses, including pacing and reactivity. Most notably is Boise's reaction to the presence of unfamiliar humans near his habitat. Upon arriving, Boise emitted intense fear-based reactions to strangers. Although he habituated to trainers with persistent conditioning, his reactivity to strangers did not lessen until after the training plan was modified. Following the gradual increase of his participation in sessions in the presence of guests, trainers began noticing calmer responses towards non-trainers in close proximity as well, especially during behind the scenes tours. Conditions under which Boise would have exhibited stereotypic running, cowering, excessive panting and sudden defection no longer prompted such severe reactions. Frequently, Boise is now observed expressing curiosity, resting or watching calmly from a distance. It should be noted, however, that although Boise's reactivity has decreased in general and many stimuli are no longer aversive, those stimuli or events that still possess an aversive quality seem to produce longer-lasting avoidance responses than those seen in the socialized wolves. Additionally, progressing through new experiences typically takes Boise more time than his socialized counterparts.

Overall, the aforementioned reduction in stress responses and the ability to cope with novel stimuli and changes to the environment suggest that Boise is now afforded an improved quality of life than he would have been had successful training strategies not been implemented. His will-

ingness to remain in all habitats, including the stage and the exhibit, regardless of guest presence, increases his opportunities for pack interaction and mental stimulation. Trainers are also now able to engage him in active creative learning sessions, a process known to enhance the psychological well-being of captive animals (Laule and Desmond, 1998).

In addition to enhancing Boise's quality of life, his new achievements directly benefit the Wolf Haven program and the park. Resources, principally the labor involved, are more manageable. Because trainers are spending less time managing Boise's behavior, all of the animals in the collection are afforded more interaction. From an exposure standpoint, Boise's presence in front of guests has yielded a significant rise in their interest and curiosity towards wolves. More guests are invested in our program, the status of wolves in Idaho and Boise's future. This has enabled the park to promote our conservation message to a wider audience.

Future Applications

The far-reaching impacts experienced in Boise's situation are likely not unique. Many captive animals housed in zoological settings have not been thoroughly socialized to humans, as is often the case with rescues, animals limited to protected or no contact, and animals that, for one reason or another, missed the ideal socialization window. By utilizing diverse, sometimes less obvious methods, these facilities have the ability to provide longer-lasting, more in-depth desensitization. In order to thoroughly acclimatize these animals to existing programs, effective training strategies may differ between levels of socialization to humans and between species. By identifying these differences, facilities may be able to offer the animals in their collection more opportunities for mental and physical stimulation during training sessions and a wider variety of housing and enrichment possibilities. Not only does this benefit the animals directly, but their facilities as well, allowing for more versatile collections and improved resource management. This objective is more feasible when these animals are more easily managed, fully engaged members of education programs, a goal achievable by pursuing flexible and creative training. Given the hidden potential of unsocialized animals within a zoological setting, understanding the heart of their training needs is the key to their success.

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In Living Color: Speed of Learning to Discriminate Between Colors in a Yellow-Footed Tortoise

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Previous studies have shown that some turtle species have the ability to discriminate between colors, as well as between different shades of gray. This experiment was designed and implemented to measure the amount of time for a juvenile yellow-footed tortoise to learn to discriminate between two colors. The tortoise was trained to target to a red spatula. After initial training, we paired the red spatula with one of five different colors, using one color at a time. When the tortoise successfully targeted to the red spatula a minimum of 9 out of 10 trials, three times in a row, it was deemed that he had learned to differentiate between the two colors. We believed that the number of sessions would decrease as we moved from color to color. Instead, we found that regardless of the color of spatula it took the same amount of sessions, or more, to differentiate between the two colors. The maximum number of sessions occurred in the differentiation between red and pink. The findings of this experiment is an excellent segue for similar studies on turtles, tortoises, and terrapins. Not only did this experiment provide a better understanding of yellow-footed tortoise's cognition, but it is a great source of enrichment and an excellent demonstration for the public.

Introduction

Although this is not a true experiment, the findings of this project are very interesting and is an excellent segue for further research experiments. Initially, this project started as a form of enrichment for our yellow-footed tortoise. "Enrichment is extremely important for enhancing the quality of captive animal care by identifying and providing the environmental stimuli necessary for optimal psychological and physiological well-being" (Shepherdson, Mellen, and Hutchins, 1998, p. 1). According to Burghardt (2013), studies pertaining to reptile enrichment have been more common, though still are quite rare. Flemming (2007) indicates the need to provide enrichment as well as training for reptiles. He emphasizes the fact that all of our actions present an opportunity for an animal to learn an association. "The key to an optimal captive environment is to facilitate animals' opportunities to make associations that enhance their well being" (Fleming, 2007, p. 1541). In this experiment, the cognition of a yellow-footed tortoise was researched to enhance individual welfare through behavior, enrichment, and training.

Previous studies have shown that some turtle species have the ability to discriminate between colors, as well as between different shades of gray. After reading an article by Disney titled: "Relational Responding by Eastern Box Turtles (*Terrapene carolina*) in a Series of Color Discrimination Tasks" (Leighty, Grand, Pittman Courte, Maloney & Bettinger, 2013) the department was inspired to do a series of color discrimination tasks using yellow – footed tortoise instead of box turtles. A colleague began the experiment and was in contact with Disney to form a basis of what information that needed disseminated from this research. In order to elaborate on the previous study, the design and implementation of this study was to measure the amount of time for a juvenile yellow-footed tortoise to learn to discriminate between two colors. According to Leighty et al. (2013), researchers used two eastern box turtles that were trained on black-and white two-choice discrimination tasks where they would target to a painted paddle for food reinforcement. One turtle was trained to target to darker shades and the other to lighter shades. Once the turtles had chosen the correctly trained color a minimum of 11 out of 12 trials, five times in a row, it was deemed they had learned to discriminate between the colors.

Not only did they do the study with white, black, and gray colors, but they also did the

study with different shades of blue and green. Both the turtles quickly learned to discriminate between the shades and target to their appropriate shade of light or dark. In this study, we wanted to determine how fast they would learn to discriminate with the hypothesis that with each color the tortoise would learn to discriminate faster.

Yellow-footed tortoises are an omnivorous species. There natural diets consist of grass, fallen fruit, plants, bones, mushrooms, snails, worms, carrion, and basically anything they can capture. That's a little different from their diets in captivity which consist of a mixture of fruits and veggies, dandelions, clovers, cuttlebones, edible flowers, alfalfa as well as crickets, mealworms, earthworms, and wax worms. Typically, previous records have shown that turtles have a preference to red and yellow foods which is why the target spatula was the color red.

Joey is a yellow-footed tortoise that was born at the National Aquarium in Baltimore, Maryland on September 9, 2009 in our rainforest exhibit. Joey is now 4 years old. He joined the animal programs department on February 26, 2013. He was very shy at first and spent a lot of time crouched in his shell or hiding. The only time he would willingly and readily come out was when food was offered. "Positive reinforcement training has proven to be effective in addressing socialization issues in a variety of species"(Laule and Desmond, 1991 and Shepherdson et al., 1998, p. 303). With the use of positive reinforcement demonstrated in this project, Joey is now out and about all the time and willingly approaches people around his enclosure. When Joey first arrived in department, he was counter-conditioned by putting a food bowl in his enclosure while gradually adding people to watch him. Throughout the desensitization process he was also gradually handled so he could be used for presentations.

Methods

Spatulas that were already colored were used rather than the paddles that were used in the previous study. There were six different colored spatulas red, blue, purple, green, yellow, and pink. The colors were chosen at random except for the color pink. Pink was saved as the last color for Joey to learn to discriminate since it was so similar to the red color he had been trained to target too. A solid background with contrast was created when the other colors were presented in order to set him up for success and provide a better chance at choosing the red spatula.

A clicker was used to bridge the yellow-footed tortoise once he targeted to the correct color spatula. Long silver tongs were used to feed the tortoise during sessions. His food reinforcement came from his daily salad diet which consisted of 15 grams of lettuce and 10 grams of toppings that included fresh fruits and veggies for that day. The toppings were what was extracted to use as reinforcement.



Photo 1

The study took place in the habitat of the yellow-footed tortoise. Before each session (complete training timeframe from start to finish) all the enrichment, food and water present in the enclosure was removed so that all that was left was a heat lamp, day lamp, and coconut shaving substrate (See photo 1). A randomized coin toss was done from http://www.random.org/coins in order to determine which hand the red spatula would be held in and which hand the other spatula would be held in. To avoid bias and favoritism to one particular side it was decided prior to the project starting that if the

coin flip generated heads or tails more than three times in a row, the fourth coin would be automatically switched to the other side. For our experiment, heads represented the red spatula in the right hand and tails represented the red spatula in the left hand. Coins were flipped for a total of ten trials. A trial consisted of each individual opportunity to target to the red spatula; ten trials composed one session.

Clicker training began on May 10, 2013. With each click the tortoise would be presented with a piece of "topping" with a pair of long silver tongs. After thirteen sessions, target training began on May 29, 2013. The red spatula was added and a lure method was used to have Joey move to the target. A piece of food was held next to the red spatula and clicked when Joey was taking the food. After a few sessions of holding the food next to the red spatula, the red target was presented at a close proximity to Joey and he touched it immediately. These sessions occurred a few times while gradually increasing the distance until Joey was at one end of the enclosure and the red spatula at the opposite end.



Photo 2

Once the red target had been learned, the official color discrimination experiment could begin. Color discrimination sessions started on August 2, 2013. The order of the colors chosen at random to pair with the red spatula, are as follows: purple, blue, green, yellow, and pink. While reinforcing Joey for the correct behavior, the red spatula is presented in addition to the food reinforcement (See Photo 2). We chose to do this once the experiment started to strengthen the association of the red spatula since there was a little bit of a gap from him actually touching the correct spatula and then being reinforced for it. Joey was picked up by the experimenter and placed at one end of the enclosure while the same experimenter also held the targets and clicker at the other side of the enclosure (See Photo 3). The clicker was always held in the left hand regardless of the color of spatula that was also held in that hand. Placement varied between having the red spatula on the right side or having the red spatula on the left side. When the tortoise successfully targeted to the red spatula a minimum of 9 out of 10 trials, three times in a row, it was deemed that he had learned to differentiate between the two colors. Once he learned to discriminate between the red spatula and another color, the color of the spatula would change until all other five colors had been used.

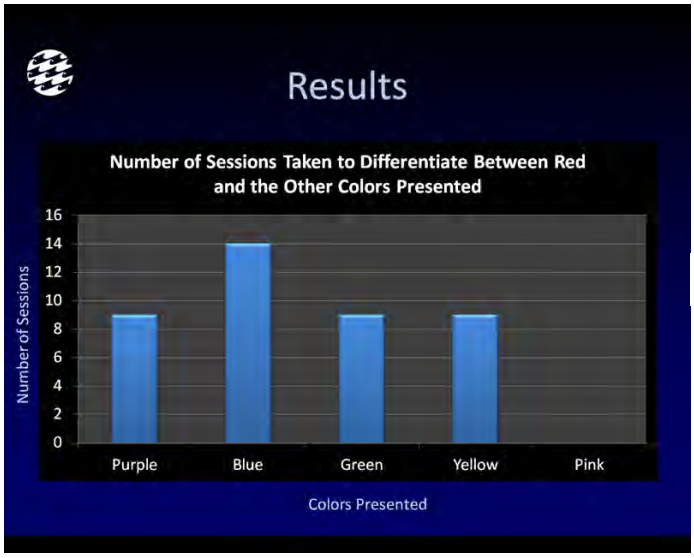


Photo 3

After each session, Joey's progress was reported and recorded on a records sheet and rated on a scale from one to five (One being he didn't do very well and five being he did exceptionally well.) Joey was always presented with his full diet regardless of his performance during training. If he didn't get all the "toppings" during the session, he got them mixed in with his lettuce after the session was completed. Joey could choose to participate in this experiment or not. Willing and eager each time, he never missed an opportunity to potentially get food.

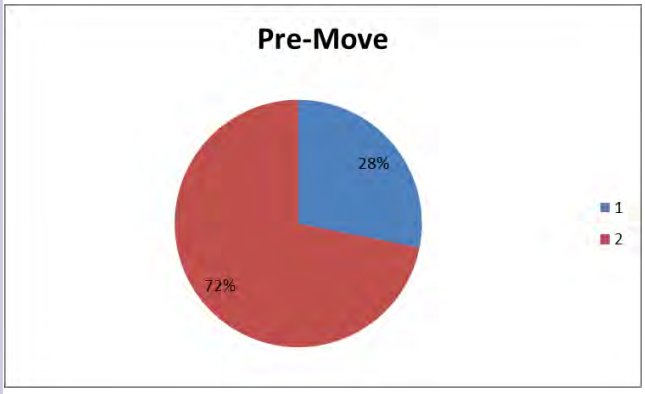
Results

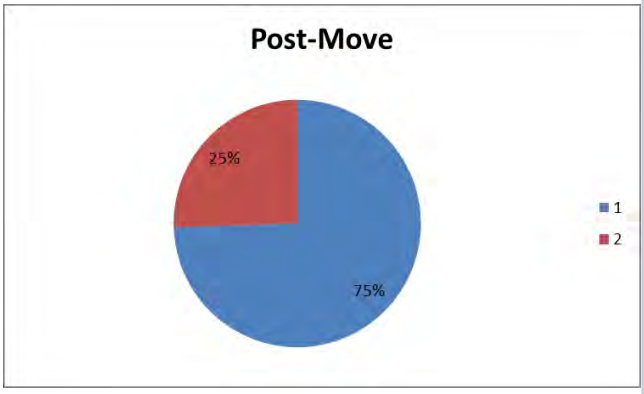
What was believed was that the number of sessions would decrease as he moved from color to color. Instead, regardless of the color of spatula, it took the same amount of sessions, or more, to differentiate between the two colors (See Bar Graph 1). For exactly 3 out of the 5 colors (purple, green, and yellow), it took Joey nine sessions to learn to discriminate between the red spatula and the other color presented. It took 14 sessions for Joey to learn to discriminate between the red and the blue spatula. The maximum number of sessions occurred in the differentiation between the red and the pink spatula. After 50 sessions it was deemed that Joey was not able to learn to discriminate between those two colors.

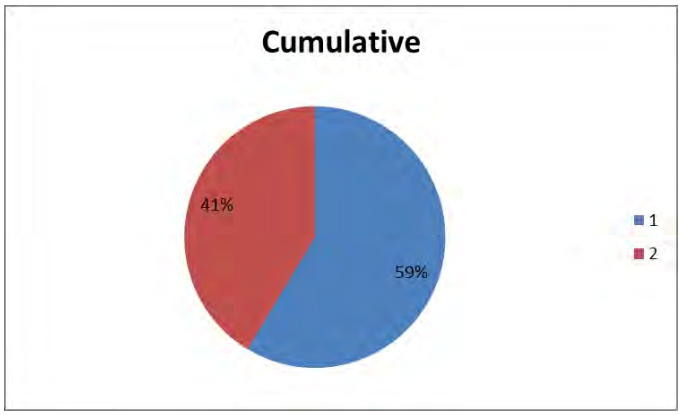


Bar Graph 1

Upon further analysis of our data collected, a bias we were trying to avoid was noticed. Joey started to show favoritism to one side. When the department moved locations, so did the side he had preference to. Prior to the department moving, Joey showed favoritism to the left side (See Pie Chart 1). Post movement of the department, Joey showed favoritism to the right side (See Pie Chart 2). Overall, it's pretty well-balanced when you look at it cumulatively speaking (See Pie Chart 3). The reason is about half of the sessions were done pre-move and the other half were done post-move, which balance it out. The location of the enclosure did change from a vertical to a horizontal positioning which may have contributed to favoritism of the opposite side.







Discussion

The hypothesis did not hold true which suggests that Joey could not learn to differentiate between colors so closely related. That raises the questions of at which point does the color scheme become too difficult for the turtles to differentiate between? Could it be different based on lineage since box turtles are more closely related to terrapins then tortoises? Is there a distinction in vision among different species of turtles? Little research has been done on tortoises and their vision. According to Saudargas and Drummer (1996, p. 179), it is important for other facilities to replicate small research designs to increase validity and generalize information of a species. We had a subject group of one, which is difficult for data analysis. We hope to encourage other chelonian keepers to enrich the lives of their animals by challenging their cognition through training. Further research ideas could involve performing these same color discrimination tasks with a mature tortoise to see if their eyesight changes with sexual maturity. It would be interesting to branch from this particular study and test either speed of learning or discrimination. In order to test speed of learning, a maze test could be conducted to see how fast they learn to navigate. Prior studies show that tortoises are excellent at remembering and maneuvering through mazes. In order to test discrimination ability, an object discrimination task may be conducted using the same color to eliminate the color variable all together, but using different shapes instead. Maintaining this behavior for enrichment, husbandry, and program purposes is also very useful for his cognition and overall health.

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Utilizing Voluntary Ultrasound to Monitor Pregnancy in an African Lion

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The use of ultrasound technology has proven to be an effective tool to diagnose and monitor pregnancy in captive animals. The Dallas Zoo's Savanna Carnivore team, along with the zoo's veterinary staff, wanted to use ultrasound to determine pregnancy and litter size of an African Lion (Panthera leo) due to the possibility of a complicated pregnancy. This paper will discuss how through careful planning, a detailed training strategy, and teamwork, the staff was able to successfully train a lioness for voluntary ultrasound without the benefit of a squeeze, which would allow them to determine when or if intervention would be necessary as she neared the birth of her cubs.

Introduction

The female lions living at the Dallas Zoo have a family history of dystocia pregnancies (pregnancies that are accompanied by abnormal labor or delivery). In May 2012, one of the zoo's 4-year-old lionesses, "Jasiri", became pregnant with her first litter. Knowing her family history, zoo staff planned for the potential of complications during her labor/delivery. Lacking a squeeze, keepers monitored her pregnancy through weekly body condition assessments and frequent weighings. On September 18, 2012 at approximately 8:30PM, "Jasiri" went into labor and gave birth to two stillborn cubs at 12:02AM and 3:40AM. She exhibited appropriate maternal signs towards the cubs, but neither exhibited any signs of life (upon necropsy, it was determined that neither cub ever took a breath upon their birth). Following their birth, the keepers were able to easily move her from bedroom to bedroom inside the holding building. "Jasiri" showed no signs of distress throughout the remainder of the day.

The following morning, "Jasiri" refused to leave the cubbing box when the keepers attempted to feed her and barely showed any response to their presence, which is highly unusual for her. The decision was made to sedate her to give her a checkup and determine what, if anything, was wrong. Upon sedation, a third cub was discovered lodged in her birth canal. Attempts were made to manually remove the cub, but were unsuccessful, meaning surgery would be required. During her surgery, it was determined that in addition to the stuck cub, "Jasiri" had a ruptured uterus. The cub was removed, "Jasiri" was sutured and placed in a mobile recovery squeeze.

"Jasiri" was able to be let out of the squeeze cage and put on stall rest on Sept 25th. She recovered under close observation quickly and was reunited with her sisters on Oct 2nd and reunited with the males on Oct 25th. Due to the potential dangers of breeding her again (whether immediately or ever again), rather than contracepting her, "Jasiri" was separated from the males anytime she was displaying signs of estrus. This management technique, though tricky due to the irregular periods of time between her cycles, was successful due to diligent keeper observations for signs of estrus. She was easily reintroduced to the pride of 2.2 lions after each separation.

Following her first pregnancy, the zoo began collaborating with SEZARC (---South-East Zoo Alliance for Reproduction and Conservation). Discussions between animal staff, vet staff, and SEZARC concluded that "Jasiri" could safely be bred again. Though it had yet to be determined whether or not she could even physically carry cubs again, staff began preparing for her next potential litter. A plan needed to be created to increase not only the likelihood of viable

cubs, but most importantly, the survival of their mother. Several thoughts of how to best manage her pregnancy were discussed, including voluntary c-section, determining litter size through x-rays or ultrasound, and when to intervene if distress is seen. It was decided that the best course of action for "Jasiri" was to attempt a natural birth, but to pre-determine litter size, therefore allowing staff to more quickly pinpoint whether she is in distress.

A bench was built by the zoo's construction staff, giving the keepers a safe space to train our female lions for voluntary ultrasounds. The bench is 3 feet high and runs 5 feet along the front mesh of one of the bedrooms. The entire bottom area under it is enclosed with mesh, allowing the staff to safely reach underneath the animal laying on the bench. Several doors were cut along its length, giving the vets several options of where to attempt the ultrasound.

Materials and Methods

In order to increase the likelihood of a successful pregnancy, ultrasound training was implemented even before "Jasiri" was allowed to be with the males during estrus. In October 2013, "Jasiri" was observed breeding with 1.0 Lion "Dinari" (the father of her first litter) over the course of 4 days. Early fecal results confirmed that she did ovulate. "Jasiri" did not show signs of an estrus cycle a month later and appeared to have minor teat develop, indicating a possible pregnancy. However, pseudo pregnancy has been documented in lions, requiring further fecal sample testing closer to 65 days after breeding. Keepers hoped to utilize this testing, along with ultrasounding, to confirm or deny pregnancy.

Training sessions were done with "Jasiri" minimally once per day (but oftentimes twice per day). Two trainers were required- one to reinforce her and one to manipulate the drop doors/ mock ultrasound wand. Initially, she was taught to lay on the bench, with her right side along the mesh. Once she would reliably lay this way, keepers began using the end of a broom handle to simulate the ultrasound wand. "Jasiri" quickly progressed to allowing keepers to touch her side/ underbelly with the wand through the stall mesh for 10-15 seconds with no issues.

Next, the keepers began manipulating the slide bolts and doors to get her comfortable with them opening while she was laying on the bench. This proved to be more of a challenge than initially anticipated when "Jasiri" began displaying minor aggressive behaviors during this process. The sounds of the locks and slide bolts of the doors being manipulated and anytime she was able to see the open door would result in vocalizing and turning her head and body towards the end of the bench where the keeper was working. She also stopped presenting her side along the mesh whenever the door underneath her was opened. Due to the potential risks to staff safety (as "Jasiri's" paws and face could easily fit through the opening), the keepers moved back to earlier steps in their shaping plan. Heavily reinforcing calm behavior whenever the bolts were manipulated and minimizing the chances of her seeing the open door helped increase "Jasiri's" confidence. Keepers were also careful to never bridge "Jasiri" unless she was laying calmly, facing forward on the bench. Within a few sessions, "Jasiri" was reliably positioning herself over the opening and allowing the keepers to touch her abdomen with the wand for 5 seconds through the open door. Throughout the initial stages of training, the vet staff would periodically attend sessions to make sure the training was conducive to what they needed to actually perform an ultrasound.

The next step was to determine what medium needed to be used between the wand and her abdomen to allow for a successful ultrasound. In discussion with vet staff, water, alcohol and gel were all options. Keepers initially used a spray bottle of water. Once "Jasiri" was reliably positioning herself, allowing her abdomen to be sprayed with water and allowing staff to touch her belly with the wand, the vet staff began coming more regularly to the training sessions. From beginning to end, training her for voluntary ultrasounds took 8 weeks.

Results

The first attempt at performing a real ultrasound occurred on December 31, 2013. Through this first attempt, it was determined that gel would be necessary to get a clear picture. One training session was needed to acclimate "Jasiri" to the sensation of having the gel spread on her abdomen via the wand. Several more training sessions were needed to determine which ultrasound probe worked best, as well as the best position to have "Jasiri" lay in to have the best chance of a successful ultrasound. During the fifth session using the portable ultrasound machine (approximately 60 days after breeding) and after several ultrasounds without seeing any fetal development, the vet staff felt sure that "Jasiri" was not pregnant. Testing on fecal samples closer to the 65 day mark confirmed the vet staff's theory of a pseudopregnancy. While discouraged by this news (even though there was a possibility that she might not be able to carry a pregnancy) staff was excited to know that should "Jasiri" become pregnant in the future, the necessary tools are at hand to give her and her cubs the greatest chance of survival.

Acknowledgements

We would like to thank the Carnivore team for all their hard work, the Dallas Zoo veterinary staff for their time in assisting us with our training sessions, Dallas Zoo management for their support, our construction staff for building us such a great bench, giving us the tools necessary to making this training a success, and SEZARC for helping us determine ovulation and non-pregnancy.

Fancy Footwork: Cheyenne Mountain Zoo's Giraffe Herd Trains for Farrier Work and X-rays

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Cheyenne Mountain Zoo

Nearly 80% percent of all giraffe sedation procedures are related to foot care. Most of the knockdowns are done once the giraffes display clinical signs of lameness, hoof overgrowth, abscesses, or swelling. Statistics show that 10% of giraffes put under anesthesia do not make it through the procedure. These alarming statistics demonstrate the necessity for institutions housing captive giraffes to develop ways to safely provide hoof care and maintenance with non-sedated giraffes. The Cheyenne Mountain Zoo (CMZ) recently started an intensive operant conditioning program to maintain the foot health of its famously large herd. The majority of the training focuses on the giraffes' voluntary participation in their own hoof care. By training the giraffes to allow for front foot handling and front foot radiographs, we are able to diagnose lameness issues, provide hoof trims, and maintain overall foot health without the use of sedation. The giraffe keepers at CMZ modified their training techniques to tailor to each of the 21 giraffes' personalities and learning styles, and have made huge leaps forward in the giraffes' overall care. This paper will outline the set-up, materials used, and the steps taken to train for hoof presents.

Background

CMZ houses around 20 giraffes at any given time. It is one of the largest herds of Reticulated giraffe in all of North America. The herd at CMZ is also one of the most prolific; it has seen over 199 giraffe births since the opening of the zoo. Due to the history of the zoo's herd, CMZ and its staff feel a strong commitment to providing the best possible husbandry, training, and enrichment for the giraffe herd.

One of the greatest challenges in housing captive giraffes is providing ways to maintain proper foot health. CMZ tasked its staff with training the whole herd for voluntary hoof presents, x-rays, and farrier trims. Within one year, CMZ staff was able to reach the majority of the goals they set for themselves in regards to the herd's foot health.

Set Up and Materials

CMZ modified the set up that was originally designed at Oakland Zoo. It is comprised of two fire hose straps that attach to a door frames at each individual giraffe's chest height. The attachment points are eyebolts which are secured onto either mesh or other eyebolts in the walls with carabineers. The CMZ giraffe barn has four different locations where the chest straps can be set up. The giraffes are trained where they, as individuals, are most comfortable.

Other materials required for footwork training include: foot blocks, target sticks, clickers, x-ray equipment, and hoof trimming tools. The foot blocks vary in height: one is smaller for older, more arthritic giraffes, and one is taller with fire hose padding. The foot blocks are glued together in order to prevent nails or screws showing up on x-rays.

The Team

The giraffe area at CMZ has three full-time keepers who also work the lion area. The keepers rotate their days off, which leaves two people per day working in the giraffe/lion area. Due to the heavy workload and sheer number of animals in their care, the keepers and their managers enacted a strategy to make the giraffe training run efficiently. When footwork training first started, keepers who had more experience training were paired with the giraffes that had less experience in training. The keepers who had less experience in training were paired with

giraffes that were knowledgeable in operant conditioning, knew their bridges, and knew how to "work" for their reinforcers. This made the team progress at the same level; once the first few giraffes were trained, the skill levels for both the giraffes and the trainers improved and trainers could work with any giraffe, regardless of whether or not it had previous experience with training.

The team also engaged in goal setting sessions before the giraffe entered the stall and talk down sessions after the giraffe left. This improved each trainer's skill level, and helped them to train at the animal's pace.

The giraffe training team also saw a lot of success due to the shared goal of improving the quality of care of their herd. Egos were left behind; they were replaced with the desire to succeed for the sake of the animals, not the sake of the people. Management supported their efforts with time to train, materials needed, time from vet staff, and the freedom to "think outside of the box".

Natural History

Giraffes in the wild can eat up to 18 hours per day. Understanding this natural history helped guide the training decisions that were made during training sessions. Sessions could go as long as an hour, and were usually cut short due to keeper time constraints, not lack of the giraffe's food motivation. Knowledge of giraffe natural history helped the keepers identify that it usually was NOT lack of food motivation that prevented the giraffe from participating, but rather that the training steps needed to be broken down a little bit, or the giraffe re-centered with easier behaviors, in order to progress forward and keep the animal's attention.

Giraffe frustration behaviors during a training session at CMZ typically looked like backing up, licking the walls, staring off into space, or leaving the area. The goal was to make sure the giraffe was set up for success. If frustration behaviors were observed, the animal was offered the chance to target, back up, or given a short break in training.

Training

The giraffe were trained for hoof presents using a positive reinforcement strategy. When the giraffes offered desired behaviors, they were bridged and reinforced with primary reinforcers (rye crisp crackers, lettuce, bananas, or bread). The reinforcers were always given in a 1:1 ratio, but the size/quantity/type of reinforcer varied depending on the behavior in question. Established and/or easier behaviors were not rewarded as much as new/harder behaviors.

Each giraffe in CMZ's collection was trained to "target". The criterion for "target" was the giraffe placing its nose on the target until it heard the bridge. This was trained by placing a target stick directly in front of the giraffe's nose. Any time the giraffe's nose touched the target they were bridged and reinforced. Durations were built by having them hold their nose to the target stick for one second, then two seconds, then three seconds, etc. until they were holding it for a length of time. Once the behavior was solid, the verbal cue "target" was used to elicit the targeting behavior.

The target stick was then used as a prompt to teach "back up" in a free contact setting. This behavior was required before desensitization to the fire hose began. To teach "back up," the target stick was positioned behind the giraffe's head, usually at chest level. When the giraffe backed up towards the target, the behavior was paired with the verbal cue "back up", along with the visual cue of a finger point backwards. The giraffe was bridged for taking steps backwards, not for touching the target. The target was faded out by taking the target stick away after the animal started to back up, and the giraffe was bridged at first for one step backwards, then two steps, then three steps, then backing up until bridged.

Both the "target" and "back up" behaviors were essential to working at/around the fire

hose set up. If the giraffe's head went too low, they were targeted back up and positive history was built by reinforcing their head in the right position. If they were pushing on the fire hose, they were cued to back up.

The fire hose training area was set up between two adjacent stalls. The shift gate between





the adjacent stalls was blocked by clipping two fire hose strips up at giraffe chest height. The clips were moveable, so that they could be adjusted based on the height of individual giraffes. Once the clips were secure, the shift gate was opened, making a semi-protected contact area for trainers to work with the giraffes. Giraffes were trained individually, and were asked to target forward in small approximations towards the fire hose. Most of the giraffes had no issues walking up to the fire hose.

After the giraffes were used to the fire hose, they were taught to place their foot on a block. The trainers decided to work with one foot at a time, so as not to confuse the giraffe or the cueing process. The foot block was placed on the giraffe's side of the training space. The primary trainer would target the giraffe forward, guiding them towards the foot block. The giraffe was bridged for kicking the block or touching the block with its foot. The target stick was then faded out and the foot/kicking behavior was paired with a cue. The cue was either "right" or "left", depending on which foot the giraffe was presenting. Once the giraffe was kicking the block under stimulus control, the criteria for the behavior was raised: foot kicking the block faded for foot touching the top of the block, foot touching the top of the block faded for foot being held on the block.



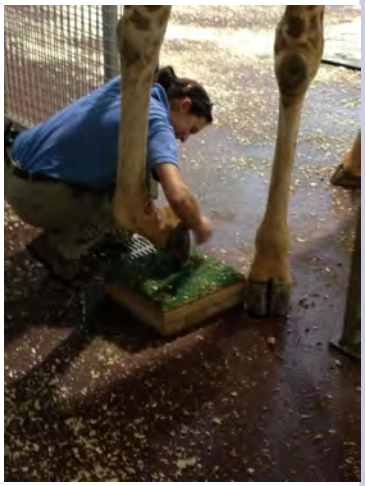
Helpful hints: know when your animal is ready to be cued. Watch for a shift in weight of their front legs, cue when the weight is taken off of the target leg. The weight shift can be prompted by the trainer walking with the target stick, and having the giraffe try to touch the target on the opposite side of the desired leg. For example, if the weight needs to be taken off of the right leg, the target stick should be moved in front of the giraffe's left side. The giraffe will lean to "target", and their weight will shift. This is when the giraffe should be cued.

When first learning the behavior, the giraffe received a high magnitude of reinforcement for keeping its foot on the block. The giraffe earned continual reinforcers as long as its foot stayed on the block; when the giraffe took its foot away, reinforcers were no longer provided. The giraffe was then recued for foot and again received continual reinforcement while its foot was on the block. The giraffes quickly learned that if they keep their foot on the block, they got a lot of crack-

ers. This high rate of reinforcement kept their attention throughout the training session.

After the giraffe had learned the foot placement behavior, they were trained to allow a mechanic to touch their foot. The giraffe's criteria was to hold their foot on the block while the mechanic touched their legs and hoof. The mechanic's hands on the giraffe foot or leg were paired with the "touch" cue. This behavior proved to be the most challenging step. Each giraffe learned this behavior a little differently, depending on their comfort level with being touched. The trainers followed "The Study of One" training approach, and watched each giraffe's body language to guide them in the process. Some giraffes were trained by allowing trainers to touch their shoulder and work the hand down their legs. Most were trained by allowing trainers to touch their hoof and work the hand up to the fetlock. The giraffe's coronary band seemed to be the most sensitive area around the hoof. Some giraffes were nervous of hands approaching them, so small approximations were taken to work hands in near their legs. If any twitching, backing up, stomping, or taking their foot off the block occurred, the trainers took a steps backwards, relaxed criteria, then worked their way forward with smaller approximations.

Once the "touch" cue was established, trainers started trying to physically manipulate the giraffe's foot. Two hands were used for the "touch" cue, and the trainers started working on moving the giraffe's foot around. "Petting" the fetlock joint tended to relax the giraffe; the giraffe would usually take their weight off of that leg while it was being pet. Once the weight was shifted off the foot, the mechanic relayed that information to the primary trainer, and "touch" is recued. The mechanic held the fetlock joint with two hands and moved the foot around the block. The giraffe was reinforced the entire time, as long as it didn't pull its foot off of the block.



Once the giraffe was allowing the trainers to touch and move its foot, the trainers started to work on the "curl" behavior. Giraffe were reinforced for the mechanic being able to bend the fetlock joint forward. The mechanic did not push on the fetlock joint if there was weight being placed on the foot. If the weight was off of the foot, the primary trainer cued "curl", and the secondary trainer near the foot would takes small approximations bending the giraffe's fetlock joint forward. When the giraffe was allowing for the curl behavior on cue, the trainers then started working in farrier tools and extra people.

Desensitization

The giraffe were then desensitized to multiple people being in the training area. The giraffe were reinforced for staying near the fire hose while "strangers" (vet staff, farriers and their apprentices, etc.) came in and moved around. If the giraffe looked nervous or broke position, the extra people were asked to back up and quiet down. The giraffe was then targeted back into the training area and rewarded for calm behavior.

Giraffes were also desensitized to x-ray equipment, farrier tools, extension cords, and x-ray gowns. The most challenging pieces of equipment tended to be the x-ray machine due to its buzzing/fan noise, and the rasp, due to the vibrations on the foot. Rasping was broken down into a behavior in and of itself for the animals that weren't as comfortable with it, whereas the x-ray machine noises just ended up being a case of habituation.

Safety

CMZ is always focusing on how best to safely move forward with husbandry training. Therefore, before each training session with each giraffe, the trainers discuss how best to safely conduct the training session. Tasks are assigned: who is going to work the door, who is going to

call a code, who is going to work each position. Additionally, if the animal does not seem like it is in a good state for training, the training session is skipped that day. For example, if the giraffe had wide eyes, flared nostrils, was running around, had its ears pinned back, etc., trainers skip the training session that day.

Care was also taken to watch the animal's body language throughout the training session. Each individual giraffe had signs of being uncomfortable, and the team communicated effectively amongst one another to let each other know if signs of regression or discomfort were being seen during training. By paying attention to the smaller, more subtle signs of aggression, and changing the training plan to make the giraffe more comfortable, the larger, more aggressive behaviors (head swinging, stomping, kicking) were usually not necessary for them to communicate to the trainers. Smaller signs of discomfort included behaviors such as the giraffe's head going up, a skin twitch, an ear twitch, or a tail swish. If the giraffe showed any of those signs, the trainer who saw it immediately communicated it to the other trainers, and all hands came off of the giraffe. By giving the giraffe a small, subtle way to say "take your hands off me", the trainer empowered them with more control during the training session. Once the giraffe knew that the trainer would "listen" to their request, they were less likely to offer those behaviors, since they know they have the control to tell the trainers to stop. When the trainers saw those signs, instead of repeating the same step they would build up some behavior momentum with easy behaviors, then match the behavior the giraffe was uncomfortable performing with a large reward. This practice tended to make training sessions much safer.

Results

The results of CMZ's giraffe training program, to date, have been astounding. All of the giraffe currently have placed at least one foot on the block on cue. Of those giraffe, thirteen have had farrier work done; a few more are ready for the farrier's next visit. Fourteen of CMZ's giraffe have had voluntary x-rays taken, which helped veterinary staff to diagnose, treat, and provide the best care to the giraffe found to have hoof issues. Three giraffe have currently had enough hoof trims to be put on "maintenance" farrier work, which means their hooves have been trimmed back to optimal shape.

Discussion

Zoological institutions everywhere need to work together to come up with ways to provide the best possible care for giraffe foot health. Due to the severity in risk of giraffe chemical immobilizations, operant conditioning training needs to gain momentum in captive giraffe management, especially when regarding hoof care. Due to the findings of our X-rays and overgrowth evaluations, we are led to believe that many giraffe might have hoof issues, regardless of whether or not they are showing clinical signs.

By instituting training plans, working through hoof presents, and garnering x-rays, information on foot pathology can be gained. This information will provide veterinarians with the best possible methods to manage pain, treat existing problems, and provide preventative corrective trims to healthy feet, all without the use of anesthesia.

Contact information:

All staff at CMZ are working together to make this a training priority. We hope to be able to help other institutions who are looking to do the same. We currently have a "Giraffe Training and Enrichment" Facebook page that is up and running, a giraffe drop box link which hosts step-by-step training videos, and a slew of people who are willing to share their experiences with anyone who is interested.

Additionally, Dr. Liza Dadone, DVM at Cheyenne Mountain Zoo is looking to gather more information on giraffe foot health. If your institution has hoof issues, has obtained giraffe X-rays, or has provided corrective trims, please contact her at: ldadnone@cmzoo.org
If you have any giraffe training questions, please contact Amy Schilz at: aschilz@cmzoo.org. She and her teammates, Andrea Bryant and Diana Cartier, are more than willing to help trouble shoot.

Acknowledgements

A huge thank you to all staff at the Cheyenne Mountain Zoo. The giraffe training program has been supported by everyone from the ground up. These people include the trainers who would do anything for the herd, Andrea Bryant, Amy Schilz, and Diana Cartier, the management who makes that possible, Jason Bredahl, Tracy Thessing, Jeremy Dillon, and Bob Chastain, and to vet staff for consistently reminding us and providing the push for this project, Dr. Liza Dadone DVM, Dr. Eric Klahpake DVM, Harley Thompson, and DeeAnn Wilfong.

Utilizing Leash Walking for Fluid Therapy with *Puma concolor* as a Model for Managing Chronic Renal Failure in Exotic Felids

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America's Teaching Zoo at Moorpark College

Chronic renal failure is a very serious and common disease in aging felids. While generally there is no cure, there are several therapies that can lead to better quality of life and extend lifespan. Many of these require cooperation through behavior management. Fluid therapy involves increasing the animal's hydration level through subcutaneous injection. Fluids are crucial since failing kidneys pass large amounts of dilute urine, and cats may not naturally drink enough to prevent dehydration. In the case of our mountain lion (Puma concolor), fluid therapy was recommended as a preventative measure and training was essential to build the behavior early. Attempts were made over several years to train voluntary subcutaneous injection with protected contact methods but no progress was made. It was proposed that fluid injections be done while on walks. Leash walking could provide a distraction, make fluid absorption easier, and be a constant reinforcer. Walking was a well-established behavior that proved reinforcing enough to overcome the aversive aspects of the injection behavior. Students worked closely with staff to determine safe and effective procedures and training plans. As a school we need to be able to have many new students participate in this behavior each year. After the success with our mountain lion (P. concolor), we began to apply the method to another felid which could benefit from fluid therapy, a serval (Leptailurus serval). We feel this method can help felids at risk of experiencing renal failure live longer, better quality lives.

What is EATM

The program at Moorpark College's America's Teaching Zoo is one of a kind. It was opened in the 1970's and started with a single wolf. Since then the program has grown to a zoo which contains around 150 animals. It continues to grow to this day with plans to expand the facility and continually improve enclosures. It is a 22 month long program which ends with each student who has completed the program receiving a certificate of achievement in Exotic Animal Training and Management. Most students also receive an Associates of Science. The program is broken up into 2 years. In the first year students take mostly academic classes such as anatomy, animal diversity and animal behavior. First year students also clean the zoo in the mornings and evenings and take part in educational shows. During the second year students are assigned animals to care for, take a training class, as well as leadership roles and have a more hands on class load. Because the college is on a semester system most of the animal assignments last for a single semester with some exceptions being made for specific animals. Spirit is one of the semester long animals which means that around every 16 weeks he gets an entirely new set of trainers and his past trainers are no longer working closely with him. With each semester students are required to train two animals at least one behavior. So Spirit has a long history of training of with varied styles and types of behaviors he has learned.

Feline Kidney Disease

Chronic renal failure is very common in older cats and can lead to lower quality of life and death. Chronic renal failure occurs when the kidneys are damaged and can no longer properly filter blood and waste products within the body. There are many causes of kidney failure, many of which are not well understood. Cats experiencing chronic renal failure will show symptoms such as excessive urination, fluid discharge, drinking lots of water, loss in appetite, weight loss and lethargy. While there is no curing chronic renal failure, there are treatments that can help ease symptoms and prevent further damage. Subcutaneous fluid therapy has been

shown to help kidney function and keep animals hydrated. Generally this is done via subcutaneous injection while the animal is lying down; it can take up to 20 minutes to administer a full dose of fluids. Fluid therapy has also been shown to have some benefits as a preventative measure, improving body function and keeping the animal hydrated.

Background on Spirit

Spirit came to America's Teaching Zoo (ATZ) in August 1999 when he was around 2 months old. He was raised by Mara Rodriguez, a staff member at the zoo. Mara has a strong background in big cats and working with them in a free contact setting. The intent ATZ had when acquiring Spirit was to be able to allow students the opportunity to work with him in a free contact setting thus broadening the knowledge students gained in the program. The free contact walking was being done with Spirit and continues to this day. He is currently the only large carnivore at ATZ that is taken out for walks. The reason for the continued walking of Spirit is because of the continued involvement and dedication of Mara. Mara is present for all free-contact work with Spirit. With her expertise and guidance this amazing opportunity is available to students. Currently Spirit is taken out for walks between 1 and 3 times a week. As exciting as this can be for the students, for Spirit this means he has a long history of reinforcement with walking and it is a part of his normal routine.

Options for Spirit

The decision was made that Spirit should begin training for a fluid injection behavior when signs pointing to the onset of kidney failure were noted. Previously in 2011, Spirit had a full anesthetized work up in which blood and urine samples were collected. This showed his BUN was mildly elevated and his Creatinine was lower than normal. He had no clinical signs and the lab work suggested he was in early stages of the disease. He was started on medication to help support his kidneys. In 2012 and 2013 they were able to collect urine samples. They showed that both the Creatinine and BUN had improved. Later in 2013 new symptoms arouse which included discharge from the eyes, nasal discharge and increased fluid consumption. The veterinarians at ATZ were unable to collect a urine or blood sample at this time but the diagnosis of kidney disease had already been made. Training is however taking place to teach both a voluntary urine collection and tail blood draw. For the time being the decision was made to increase his fluid intake. Frozen ice cubes with dilute pigeon blood and beef bouillon were offered. However if his kidney function deteriorated further it would become necessary to inject fluids subcutaneously. Training would need to begin sooner rather than later. Because if the disease progresses he will experience symptoms such as anorexia and lethargy which are counterproductive to training.

People consulted

When beginning the training for the behavior many people were consulted before work began with Spirit. Mara was the person with the strongest and longest relationship with Spirit so she was the main person consulted when deciding a training strategy. Gary Wilson the instructor of the animal training class was also consulted to gain another viewpoint on the training plan. The vet staff consisting of Dr. Leah Greer and vet tech Lory Palmer were also consulted when deciding the appropriate equipment for the task. We also consulted Dr. Cynthia Stringfield, a member of the school's faculty as well as veterinarian, for suggestions of equipment.

Training Steps

The walking behavior was a previously established behavior so no work needed to be done to train this aspect. During the summer semester, beginning in May, as had been done in

previous semesters training began in protected contact. The issue of protected contact with Spirit is that he is required to be in such a specific position for the injections to take place. There is no way to vary the pattern of his injection so he quickly recognizes the antecedent behaviors to the injection and leaves the session. Another issue is the amount of time to work through these avoidance behaviors is longer than the time trainers are assigned to work with him. Once one trainer begins to make progress the incomplete behavior must be turned over to the next set of trainers. Because of the inevitable variation between training styles the behavior quickly regresses and the training starts over again. Anna Dahlin and Jenna Roark were assigned to train him over the summer for his protected contact injection behavior. Significant progress was made - he was accepting a needle and holding in position for short periods of time. However, a fluid line and actual fluids had yet to be introduced. Once the turnover process began the behavior yet again broke down and he was reluctant to even get into position.

At this point the decision was made by Mara to attempt the injection behavior in a restricted contact walking situation for multiple reasons. Anna Dahlin was chosen to continue the work while Charlotte Trapman-O'Brien, one of the newly assigned trainers who had previous injection training experience, would work with her to begin training. On the walks A. Dahlin practiced grabbing his scruff and applying pressure to the injection sight. The place chosen to insert the needle was on the neck just above the shoulder blades. This sight was chosen because of the amount of scruff and the fact that the needle had been introduced there before.

The first attempt to stick him with a needle while out for a walk had been the previous summer (2012) with Will Warden who had been the trainer to progress the furthest. It was only done once as a final step in training not a starting point. When A. Dahlin attempted the needle stick the second time it had been outside his enclosure with a small gauge butterfly needle. We walked him to one of our theaters. Mara walked him around the area and then brought him to a mark. Because this was the first attempt, Mara made the call to drop a larger than normal amount of food and then stick him to make sure he was thoroughly distracted. Once the food was placed, A. Dahlin grabbed the scruff, inserted the needle, and then removed it quickly. He seemed to have no reaction and was eating throughout the entire event. During later needle sticks, he was rewarded after the needle was inserted. The next attempts were done in a similar manner with increasingly larger gauge needles. We no longer used a butterfly needle because we did not have any large enough to supply the amount of fluids in a timely manner. The final gauge and size decided upon was a 1 ½ inch 18 gauge needle. We saw no changes in behavior with regard to the length or gauge of needle.



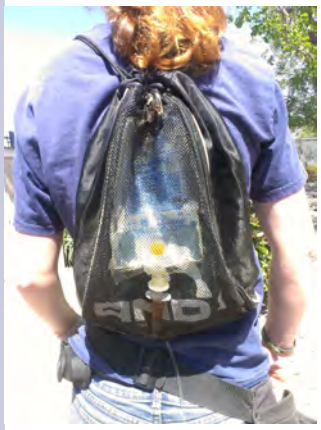
Our next step was to introduce the fluids being injected. We started off with a small syringe attached by a fluid line to the needle. The needle was inserted and then the plunger was used to slowly inject fluids. While the fluids were being injected, Spirit was walked around different areas of the zoo to serve as reinforcement for the continuous fluids. Again we saw no changes in his behavior that would suggest he was uncomfortable in anyway. One thing noted was we would need just the right length of line to ensure the flow of the fluids and the ability of him to move freely without pulling out the needle. We would also need to begin taping the line to his back to keep the needle in place. The size of the syringe and the amounts of fluid grew until the largest syringe the vet staff carried were being used. Charlotte Trapman-OBrien began sticking him at this point and was the primary person injecting him. A. Dahlin was still present at the fluid walks however and helped to solve problems that arose. Once the large syringe had been fully

injected we had to switch over to a small fluid bag. We started by only injecting a small portion of the bag then worked our way up to the entire contents. As the amount of fluids injected increased, the length of the walks also increased to account for this. During these longer walks with increased amounts of fluid, we noticed that the walking also helped to spread out the fluid rather than creating a large fluid pocket often seen with fluid therapy.

Tools used

During all walks with Spirit, certain safety equipment must be present and procedures must be followed. Everyone holding the leash must be wearing long pants and carrying a bop stick, a wooden dowel with a large diameter. This is most commonly used to be tossed on the ground and serve as a distractor to break his focus. Because the protection of the students is always at the foremost of all zoo staff's minds, Mara is always immediately present for all walks with Spirit unlike other animals at the zoo. Mara also carries pepper spray on her person at all times and a radio to communicate with other zoo personnel. Spirit is walked on a chain leash with two clips attached to separate links. This is the portion which serves as his collar, double secured. In addition a catch rope and an additional chain leash with two clips are carried by two separate individuals who are not holding the main leash. During walks Spirit is reinforced with Nebraska meat, mice, chick, chicken neck, fish, and rabbit in various quantities. He receives 2-5 pounds of food each walk which is split between several containers and held in bait bags carried by the students. Food is fed from the ground or marks.

In addition to supplies for walking, items for fluid injections are carried on fluid walks. The fluids are carried in a standard bag and attached to a fluid line. Fluid lines come in various lengths and a 72 inch line was used for Spirit. This allowed a safe distance from him and flexibility for his movement. For the injection an 18 gauge 1 ½ inch needle was used. The large gauge increased the amount of fluids going in so less duration was needed and the length helped in keeping the needle in his skin. Although the person controlling the fluid does not carry the leash, it was important to make sure their hands were free. A backpack was customized to carry the fluids and many of the supplies. Fluid bags are suspended from the top section of the drawstring backpack with a clip and the fluid line runs through the bag and out the bottom. The fluid bag is placed in a mesh section on the front of the backpack. This allows it to remain secure but visible so checks can be done on how much fluid is going in. The elevation of the bag via the backpack helps the fluids flow faster; the fluid line has a control valve that allows a range of flow amounts. In the pockets of the backpack are spare needles and tape. The backpack is worn with only one strap on the shoulder allowing the person to slip it off easily in the event that Spirit moves away too quickly. Over our many attempts, the biggest difficulty proved to be tape. We tried many different varieties of medical tape and eventually found the best option to be Elastikon tape. Both cats shed a great deal and more common varieties of medical tape seemed to fall off very frequently. Elastikon did not fall off and was removed very easily. Duct tape was also suggested to us as a possible option but we did not try it in our time with the cats.



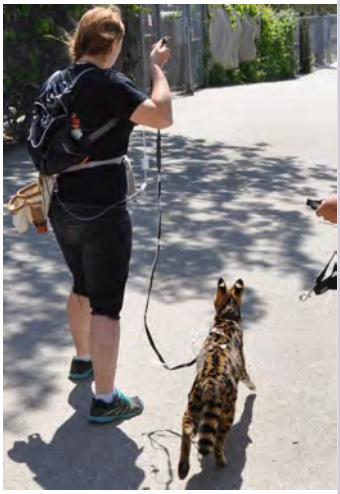
Fluids were attempted over the course of 8 months. Initial fluid amounts were small via syringe, starting with 10 mL and progressing to 25 mL. When attempted with the fluid bags were begun, a 250 mL bag was used with various portions being delivered. Slowly duration of fluid delivery increased and an entire 250 mL bag could be delivered on one walk. Vet staff advised that 250 mL would be a safe practice amount of him to receive frequently. However if his kidney disease progressed further he would likely need to receive 500 mL three times a week. Walks with

fluids are currently done no more than once a week with regular walks occurring 2-3 times a week. This was to ensure that walks remained positive and not only associated with injections. During this process there was only one time that Spirit moved away from the needle. It was during a period when he would often become startled during walks and hesitate to walk far from his enclosure. When attempting to place the needle he stopped eating and stepped forward out of reach. This reaction was taken very seriously, no further attempts were made on that walk. The pattern of hesitancy on walks continued and further injection attempts were not made until his walking habits returned to normal.

Ibis

Ibis is a 10 year old serval who has been at our facility for a little over a year. Previously she was owned as a pet and then lived at an outreach facility. When Ibis came to our facility her initial exam showed that she had some decreased kidney function indicative of chronic renal failure. In December of 2013, Ibis experienced a 3 day period of vomiting, decreased appetite and lethargy that eventually led to an anesthetized exam. The exam revealed no specific cause but that it was likely due to her chronic renal failure progressing. She was found to be dehydrated and given a large amount of fluids. After this incident she was switched to a prescription low protein diet. It was decided she would be a good candidate for a fluid injection behavior.

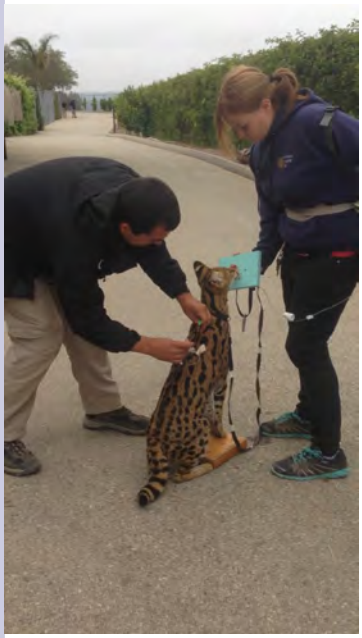
Similar to Spirit, Ibis was frequently walked before starting fluid therapy. Because she was a small cat there were significant differences in her walking protocol. Staff does not need to be immediately present, she can be walked with just two students. A bop stick and pants are not required, and because staff was not needed she can be walked much more frequently. She is also used in shows. When walking Ibis, she is much faster and tends to wander farther from us. This required us to alter the length of fluid line we were using and maneuver it differently. Being able to deliver fluids on walks was especially important for Ibis as she is a very active cat. It proved challenging to train her to stand still for any brief period of time and traditional fluid therapy techniques would have involved her laying down for up to 20 minutes. Ibis did not have any previous desensitization to needles but she had a long history of tactile desensitization and was very comfortable being touched which worked in our favor.



Training

When working with Ibis she was assigned two trainers, C. Trapman-O'Brien and Nick Hubeek. N. Hubeek had a background in veterinary care, having worked at a clinic, and proved a valuable resource for improving the training process with Ibis. Both trainers worked on the behavior simultaneously. We began by strengthening a marking behavior to a specific mark and requiring her to keep both front feet on the mark. Whenever interacting with her we would touch her scruff area just behind her shoulders and began tenting and pinching the skin very early on. We would also tent the skin and lightly poke with our fingernails while saying "poke." When her foot mark was strong we decided to incorporate a nose target as well. This was to help keep her focused while marking. It also may be important for later on, if her illness progresses she could lose her appetite and may not be food motivated when needing fluid therapy. We incorporated both marks with one trainer holding the needle and fluids and the other holding food and the nose mark. Several weeks were spent acclimating her to this set up while we progressed from using just a fingernail to a using a blunted needle. More time was spent desensitizing her to the nee-

dle because she had never been trained an injection behavior previously. When using a real needle we started with a small needle, ⅝ inch 25 gauge. She showed no reaction to the needle.



The next walk we used a 1 ½ inch 18 gauge needle which was what we had estimated would be most efficient for fluid delivery. Again she showed no reaction and maintained her foot target. We began to have difficulties with her nose target, she would attempt to break target and look behind it for food or touch it with her paw. We worked protected contact with the marks to strengthen her holding on them. Next we introduced the fluids. We continued using a 1 ½ inch 18 gauge needle and opened the fluid line. We monitored carefully for any adverse reaction from Ibis. There was no initial reaction so we made the decision at the time to give a fairly large amount of fluids on that walk. During the walk we continued to monitor her, a few times she would stop and turn her head toward the injection site, sometimes licking at the area. When this occurred we used a target and meat to re-focus her attention. In total she received 150 mL of fluid during the course of the walk. This amount was deemed safe for routine injection by our veterinarian. We noted no sensitivity in the area after the fluid line had been removed.

At this time we also had new students assigned to Ibis who needed to learn the procedure. The two new trainers began attending walks to observe fluid injections. They were also given several tutorials on needles and injecting. Both new trainers were able to successfully poke her with the needle and take over targeting her. In addition, because Ibis proved so focused during the behavior and Spirit was less frequently walked, the new Spirit trainers were able to practice tenting Ibis' skin in the proper position and practice poking her with needles to help prepare them for working with Spirit. During the course of these sessions the new trainers marked her and kept her attention. Ibis showed no reaction to multiple people being present or to having new people using the needle. This gave us confidence that this behavior can be successfully continued after we have graduated.

While our procedures for the two cats varied slightly our basic premise, the fact that leash walking is an important part of the process, remained the same. Both cats are early in their disease stage and it remains to be seen how the behavior will change when they reach later stages. By doing fluids now in this manner we have established a foundation for the behavior and linked it to a highly positive activity that they can continue doing when receiving fluids. It is our hope that providing a small amount of fluids on a regular basis may keep kidney function at a higher level for some time. In addition, once both cats reach the state of requiring larger doses of fluids they will have a strong background that will allow us to treat them. Having seen this process with two animals at our zoo has changed what we view as possible for the other animals in our collection and serves as an inspiration for starting ambitious training behaviors for medical purposes much earlier.

Challenges of Training a 16 Year Old Cockatoo *(Cacaua sulphurea)* to Fly a Loop; Implications for Shows and Enrichment Opportunities

Christina Lavallee
Zoo Atlanta

Sydney, a lesser sulfur crested cockatoo (Cacaua sulphurea) was hatched in 1995 and re-homed to Zoo Atlanta in 2000. She has participated in Zoo Atlanta's Wildlife Theater shows for the past decade, demonstrating natural behaviors. She has a history of flying to the hand but only with a distance of a few feet and requiring a lot of encouragement. Sydney has never been a confident flyer and has damaged center deck feathers that affect her flight. At the beginning of the show season, she was comfortable flying the distance of the backdrop. During the summer, this expanded to flying near guests from a stationary perch and we wanted to take this even further. Could Sydney learn to fly a complete loop with her history, lack of confidence, and damaged tail feathers?

Her strength and confidence were slowly built up. Initially, the same two trainers began training the behavior, beginning with the pole used to hold up the shade structure as a point to target her around. She was comfortable when she could see the trainer catching her, but when she couldn't; she would lean her body, or turn around, to try and see the other trainer. Once she overcame this obstacle, back chaining was rapid until the second pole. As she overcame each challenge, her confidence grew and her flights improved. The process of overcoming hurdles like flying on the first cue, staff consistency, and flying over guests has been a long one, but watching her success was well worth it.

Introduction

Zoo Atlanta is one of the oldest zoos in the United States and is home to hundreds of species from around the globe. The Wildlife Theater has been the home of the zoos free flight shows for years. The theater's collection includes 19 birds including four psittacines. Three of the four parrots have been re-homed several times with Zoo Atlanta as their final residence. Sydney, a lesser sulfur crested cockatoo (*Cacaua sulphurea*) was hatched in 1995 and re-homed at the Zoo in 2000. Her history prior to coming to the zoo is missing. When she came to the zoo she had some bad habits including screaming, plucking, and biting. She became more comfortable in her new surroundings, traveling as an ambassador program bird and for Wildlife Theater shows; demonstrating natural behaviors from a stationary perch.

Sydney has worked in shows for many years now. Most recently, she demonstrates natural behaviors from a stationary perch or from the trainer's hand. She will open her wings, turn around, hang upside down and even mimic a few words. One of the behaviors is an A to B flight to the hand with a distance of approximately 4 but up to 10 feet. The evolution of her loop flying behavior stemmed from her only offering hops off of a stationary perch to the hand from a decreased distance of two feet.

In 2012, many changes were occurring in Sydney's life. She had lost much of the staff that had built relationships with her, replacing them with new faces. Her new primary keepers came with new varied knowledge, thoughts, ideas, suggestions and experiences that helped with husbandry and training. She had also been living in the program animals building. After a renovation at the Wildlife Theater, she was relocated to enclosures there. This move had the bonus of more staff time for impromptu training sessions, as previously she was kenneled and walked across the zoo to the theater. Lastly, she had some diet changes. Since she had been on a 'working' diet for an unknown length of time, she was given the opportunity to go on feed up.

During this time she was offered an unlimited amount of food until she was leaving leftovers. The animal nutrition kitchen prepares and delivers an amount of produce individually bagged daily for each bird. Harrisons parrot chow is added to complement the diet. As it so happened, not much difference was observed between her original diet and her fed up diet as she would pick out the things she liked eating and leave the other food behind.

Initially, with the new staff, she had a very poor response to the cue to fly. She also required a lot of encouragement to do so, which wasn't good in a show setting. While flying, she exhibited a lack of confidence and uncoordinated flight. Some of this could be attributed to her abnormal tail feathers. Due to some activities she likes to partake in her home enclosure, the deck feathers don't grow in correctly. All of these reasons had some affect on her motivation to fly.

First we had to figure out what was motivating her. Sydney loves attention. She enjoys the interaction with her trainer. During shows she regularly works the audience until she gets a reaction. She loves applause, laughter, and verbal praise. She also works for her diet daily. She gets a variety of Harrisons parrot chow, sun flower seeds, and mixed fruits and veggies. She also will get mixed nuts; almonds are a favorite. For the sake of convenience, the dry chow and sunflower seeds are used on stage. She also enjoys exercising control over her environment. During flight training, she had the choice to participate and when she did, chose to fly high or low.

Over the winter of 2012-2013, her response to the cue was worked on. A reinforcement cycle started with short flights to a perch and to the trainer's hand. These short flights started to build her confidence level. With her increased confidence, her distance increased and she responded to the cue faster. Sydney's relationship with the trainers improved. The accumulation of all these things increased her strength, further increasing her confidence. It was a win-win for bird and trainers.

In previous months, she had been flying on and off stage to start and end her routine. Even though the distance wasn't significant (less than a dozen feet) when she would fly out, she would hesitate and fly erratically, looking more like a butterfly. Now she was flying straight to the trainer on cue without the extreme encouragement that she had needed six months earlier. During June of 2013, we added to her confidence and began her loop training in earnest.

To keep Sydney from getting confused, the same trainers worked on the next steps with the plan to hand off the behavior once completed. There had already been some behavior breakdown when trying to incorporate other trainers. Mostly, they were small idiosyncrasies between trainers.

Since Sydney was now much more comfortable flying from the perch and greater distances to the show host in the audience or during training sessions, she was released from a pole in the audience that holds up the shade structure in the summer. Her biggest challenge was deciding to launch herself off the hand when she could not see the trainer on stage. We did a couple of repetitions of going to the trainer from next to the pole. Then we took a small step backwards and used the massive pole as a visual block. She moved her head to try to see the trainer onstage (quite funny). Once she went around the pole to see the trainer, the first hurdle was crossed. With another step back, she again had eye line to the other trainer and would fly straight down. By not reinforcing these flights but only the ones when she went around the pole, she soon learned it wasn't worth her time to exert the energy of a straight flight if she wasn't going to get her favorite rewards.

We were able to continue her training using back chaining. Back chaining is when the end of the behavior is learned first and then worked backwards to the beginning of a behavior. In essence learning the end first. By using back chaining, she was backed across the theater in a clockwise fashion. The next hurdle was a second landmark, another pole. It was already in her environment so might as well use it. As she had been reinforced for going around one pole, when she en-

countered the second one, she stuck to the same criteria. We did not. She soon figured out what we were asking: "I go around both poles for reward". Finally we were able to release her from stage and she would do the whole loop. Success!!! Or was it?

Her new behavior was incorporated into a show as we knew there would be kinks to work out. Oh, were there kinks. The first crowd she had flown over was a handful of interns and staff that wanted to observe a training session. Because they were randomly seated, people she knew, and so few, she had no problems. With the smaller winter crowds, she would refuse to fly. We were able to arrange 'training demos' during the week to get smaller groups of people. Due to the nature of our training demos, we manipulated any visitors who showed up to set Sydney up for success. Initially we gradually added people until we had a clump of people. We would get everyone to sit together on the far left side of the audience so she wouldn't have to fly over them as long. As soon as she passed over the guests, she would be landing and getting rewarded. Those were some of the funniest flights because she would have great momentum but then hover as she decided to continue around or cut the flight short. With the guests we could also incorporate another aspect of reinforcement that Sydney responded well to, attention. We could in essence cue the audience to applaud for Sydney's successful flights.

She became more successful and confident with each repetition. Her flight pattern had become more controlled. In initial flights, she would leave the hand and skim over the bleachers. Her later flights she added height and a crest up, especially as she came in for a landing. We were able to back chain the audience, having them sit and spread out in the center section and then move around to the right side of the stands.

She was now ready for shows. Except she wasn't. With audiences, she was still initially nervous with a lot of faces looking at her and taking off over their heads. The next plan was put into play by reincorporating the second trainer. We went back to our first step of back chaining except with the audience present. Back chaining around the first pole, in through the center section and into the right section moved quickly. Guests seemed to enjoy the up close view as she started from in the middle of the crowd. Hurray!!! Sydney has the whole behavior and can finally be released and caught on stage. She occasionally has moments where she struggles to leap off the hand into a crowd of guest faces. But we know how to work through it.

Another challenge is in trying to wean out subtle cues. She still needs some of them. When she is released, she is watching out of the corner of her eye. If her trainer isn't moving into position she will cut the first pole. Eventually where she is released will be a stationary position.

Sydney is a fickle bird. She likes to test the system on a regular basis. As new trainers are taught her new behavior, we have seen a behavior breakdown. She tests the new trainer with a mix of correct and incorrect offerings of the behavior.

The behavior is still in the works. Whenever a new staff member starts, we know from her history that she will test them. Since it is similar actions, it is fairly easy to work through them as we have already encountered the activities before.

Implications for shows/enrichment

Since her more intensive flight training started, she has become a lot more confident. When the shows are cancelled in the theater, we will still do a mini show on the main walkway outside of the theater. We have had the opportunity to fly Sydney a nice distance for guests. She also travels to other venues on grounds. Recently, she went to a large auditorium and was comfortable flying across the first couple of seats of guests and up to the trainer. The flexibility of being able to travel, demonstrate her natural behaviors, and fly add the extra element to programs that she wouldn't have gotten. She is now part of more dynamic presentations and shows. There has been an increase in her welfare as she enjoys traveling around the zoo. She gets more opportunities for

training and training is great enrichment. Plus, guests love her interactions and she gets the attention she loves.

Conclusion

Despite the numerous challenges in training any animal, the successes are worth the time invested. Some of the implications for other behaviors were the ability to incorporate the training sessions into the confines of the show. Besides the training that Sydney received, guest reactions and understanding of the training process was greatly increased. Guests could assist in training through cued requests of the audience for applause. Finally, even with all the changes to Sydney's lifestyle, and lack of a history of flight, she learned to fly with more strength and confidence than she had ever previously displayed.

Don't Mind the Quills: Training 0.2 Cape Porcupines to Become Program Animals

Katie Cheng and Susan Patch
San Diego Zoo Global

In 2011, 0.2 three month old Cape porcupines, Hystrix africaeaustralis*, were acquired by the San Diego Zoo to become program animals. Although they were hand raised, they were unaccustomed to tactile stimuli and would display aggressive behaviors when trainers were present. By ignoring aggression and positively reinforcing calm behavior, trainers were able to teach a variety of behaviors. These behaviors including wearing a harness that goes around both the head and body, as well as a set of behaviors that allows them to interact with guests, including both photo and feeding opportunities. Much of the training success also relied on a unique "manners" system developed by trainers. This system involved training each porcupine to "heel" as well as to display a relaxed body position. In addition, both porcupines were taught husbandry behaviors. As porcupines have delicate skin, medical procedures can be especially challenging. To help prevent unnecessary stress and minimize the risk of a skin tear and subsequent infection, the porcupines were trained a voluntary pole injection behavior that could be used for annual vaccines. As a result of these training techniques, the porcupines now aid in their own care, interact safely with thousands of guests yearly, and can work with nine or more trainers.*

Introduction:

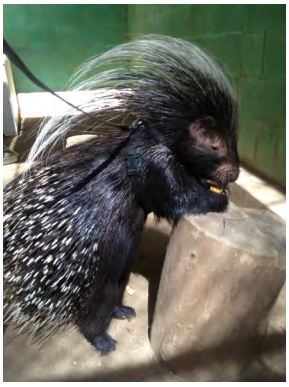
In 2011, the San Diego Zoo acquired 0.2 Cape porcupines, *Hystrix africaeaustralis,* named Ruva and Ikwezi, at 3 months of age. Although these sisters were hand raised, they were unaccustomed to any type of tactile interaction and would act aggressively when trainers were present. Aggressive behaviors included: tail rattling, stomping feet, loud grunting, and hitting trainers with their quills. By ignoring aggression and positively reinforcing a reduction in aggression, calm behavior, or both, trainers were able to decrease aggressive behaviors and increase calm behavior. Once a more relaxed demeanor was established, trainers began training the porcupines to accept and be led by a harness to allow the animals to interact with the public. Furthermore, a unique manners system was developed that has lead to substantial success of these porcupines as program animals. Finally, husbandry behaviors were also trained to allow easy, low-stress medical care.

Harness training:

As program animals, the goal for both porcupines was to get them comfortable interacting with the public within close parameters. In the past, the San Diego Zoo has used dog collars to go around the porcupine's chest as a harness. Although this method is commonly used at many facilities, porcupines have been known to back up and slip out of this makeshift harness. To help prevent this from happening, a "figure eight" harness that goes around both the neck and body was introduced. The Size Right harness for dogs works well as it is able to adjust to the small size of the porcupine neck and a larger torso. It also has a swivel ring, which allows for greater mobility in comparison to the dog collar.

To begin harness training, the pre-established "mark" behavior was used. Once the porcupine was marked up on the stump, trainers began the process by desensitizing the harness, initially just holding it in their hand and gradually bringing it closer to their head. Once the porcupines were comfortable with the presence of the harness, successive approximations were made to have the harness completely on and clipped. These steps included getting the animal comfortable with the harness going over the head, having crest hairs gently pulled out from un-

derneath the strap, having the harness tightened around the neck, the remainder of the harness being laid on their back, and having the trainer reach under the animal to pull the bottom strap of the harness around and clipping it at the shoulder. During this time, trainers continued to positively reinforce tactile stimulation with the porcupines, especially in areas around the back, stomach and feet that may be touched while putting on the harness. While in the process of training the harness behavior, trainers also began to implement a "manners" system that could be used to provide safe interactions with both the public and trainers.



Manners System Training:

Using knowledge gained from experiences with a potentially aggressive 1.0 Cape porcupine, Tsilo, the current manners system was developed. During training with Tsilo, he sometimes ran ahead of trainers and cut them off, putting himself in a position in which he could bite or use his quills to block his trainer. To prevent this from becoming a problem with Ruva and Ikwezi, they were taught a series of behaviors that encompass the manners system. The first of these behaviors was the "heel" behavior.

Criteria for the "heel" behavior requires the porcupine to be on the left hand side of the trainer, with its head slightly in front on the trainers feet and the end of the quills behind their feet. A target pole was used to attain correct body position. Once in the correct position, trainers then began using small approximations to begin moving around the enclosure, again using the target pole to maintain the porcupine's body position. Initially, trainers reinforced every few feet and worked their way up to walking an entire loop around the enclosure. Both porcupines were also reinforced for stopping with the trainer and remaining at their side, rather than continuing on ahead. Once a high rate of success with the target pole was achieved, the target pole was faded out. In the event the porcupine does run in front of the trainer, three methods are used. First, the trainer can ignore the incorrect behavior and begin walking in another direction, reinforcing the porcupine when it returns to correct body position. Second, the trainer may ask the animal a control behavior, such as going to a mark, to regain their attention. A third method that is used is a "go around" behavior. This behavior was also trained using the target pole and has the porcupine walk around the trainer to return to the correct body position.

The second part of the manners system involved positively reinforcing a relaxed body posture. For example, if quills were raised and not relaxed against the body when attempting a harness behavior, the trainer would wait until the porcupine relaxed its quills. They would then bridge and reinforce the relaxation before continuing on. This was a continuation of training done initially when the porcupines first arrived at our facility. Trainers also continued to reinforce the lessening of precursors to aggression such as rattling the quills on their tail. It is important to note that each manners program was also tailored to each animal. For example, Ikwezi tends to be more cautious and less confident than her sister in new situations. Because of this, trainers will reinforce her normally if she is slightly rattling her tail in new situations but is still displaying an otherwise calm body posture. Ruva, on the other hand, is much more confident than her sister and almost never displays any tail rattling behavior. Because of this, if she were to display a tail rattle, the trainer would immediately move to get her attention by asking a control behavior, such as a mark, then reinforce calm behavior before moving on.



One other aspect of the manners system is that it must

constantly be maintained. Neither porcupine is perfect, but the benefit of the manners system is that it allows for options to positively reinforce each animal to avoid frustration. In addition, having a consistent manners system in place has allowed nine to twelve trainers (depending on the porcupine) in different areas of the zoo to successfully work with these animals in a variety of settings. Manners behaviors are also worked both on and off leash and in a variety of areas.

Application of learned behaviors:

The use of the manners program and the unique harness has opened doors allowing trainers to teach a variety of new behaviors. Both porcupines now participate in both on- and off-site presentations and media events, and most frequently the San Diego Zoo's Backstage Pass program. In this program, guests are able to get up close and personal with our program animals, and each porcupine can interact with up to 100 guests per day, including a stage segment and photo opportunity. For the photo opportunity, the porcupine is asked to walk up a ramp to the top of a box and stay on a mark, positioned so the quills are facing away from the guests. The trainer stands to the side of the animal next to a photographer and out of the picture and the guest then stands next to the porcupine. In general, the porcupine is reinforced after an individual picture has been taken. In smaller groups, or at night events, feeding opportunities may also be given to guests. A long piece of yam is handed to the porcupine while they are once again on a mark as a control point. Additionally, the porcupines are often taken on walks along public pathways within the zoo, where they encounter groups of guests, strollers and wheelchairs, vehicles ranging from carts to double-decker buses, stimuli from other animals on exhibit, fallen fruits and leaves, etc. Walks are very beneficial to the porcupines for enrichment and exercise, and the manners system and control behaviors assist trainers in overcoming any difficulties the porcupines may have.





Husbandry training:

Although it was important to teach Ruva and Ikwezi how to be comfortable around both trainers and the public, it was equally important to teach them husbandry behaviors. Both porcupines were trained to accept tactile stimuli and allow trainers to touch their head, feet, stomach, back and legs. This is important as it allows trainers to check their nails and examine any potential injury should one occur. Ruva and Ikwezi were also trained to stand on a scale to gather weekly weight information. Finally, both porcupines were also trained a voluntary injection behavior.

From previous experience, San Diego Zoo staff were aware that Cape porcupines have very delicate skin that can tear easily, and once injured, can be difficult to repair. For these reasons trainers decided that a voluntary injection behavior that could be used for annual vaccines or the administration of medication if ever required would be very useful. For trainer and veterinary staff safety, it was determined that a pole syringe would be the best option for this training program. Because the posterior half of the Cape porcupine's body, where injections are often given to other animals, is covered with long, thick quills which obscure the anatomy, the shoulder was identified as an ideal substitute injection site. To begin training the behavior, the porcupines were reinforced for standing on a mark while harnessed and leashed with the trainer working the ani-

mal on its right in the normal body position. A second trainer then stood two feet away from the mark on the opposite side holding an object that appeared to be the pole syringe. For this training program, a wooden dowel with a syringe on the end was used. A dull porcupine quill was placed in the end of the syringe to simulate a needle. Once the porcupine was comfortable with the presence of the trainer, the porcupine was asked to target their nose to the trainer's hand towards the syringe while it was pointed just behind their shoulder. Successive approximations were taken until the porcupine was physically pushing on the end of the syringe. The trainer holding the syringe than began to apply pressure to the porcupine's body, while the trainer working the animal reinforced the porcupine for continuing to push into the syringe towards the hand target. Once enough pressure against the syringe was achieved for a successful injection, trainers began replacing the individual practicing the injection with individuals the porcupine did not know. This process went quickly and soon hospital staff was able to replace trainers in handling the pole syringe. This behavior along with all other husbandry behaviors is also regularly maintained and practiced.



Conclusion:

In conclusion, the San Diego Zoo was able to develop two highly successful program animals through the use of a unique manners system, a new type of harness, and the training of various husbandry behaviors. While helping with their own care, both Ruva and Ikwezi are also able to interact safely with thousands of guests yearly and will continue to do so in the years to come.



Posters

What to Do About At Tooth?

Lauren Attaway and Lauren Schneider
Texas State Aquarium

In the spring of 2010 a trainer working with "Chiquita", a Prehensile-tailed Porcupine (Coendou prehensilis), noticed a front tooth broken above the gum line, along with overgrowth of her two lower teeth. Due to the sensitive nature of this injury, a plan was devised to file down the lower teeth and inspect the gum line of the missing tooth. However, the location of the injury and the time it would take to complete the inspection meant she would have to go under sedation. Previously this would have involved baffle boards and welders gloves to place her in the isolation chamber. To avoid stress, the plan was to build on her established crating behavior. By using positive reinforcement and operant conditioning, her crate behavior became generalized and she successfully entered her home made isolation chamber on the first try. The procedure was successful and the isolation chamber is now a part of Chiquita's daily routine. Using this method allowed her keepers to reduce stress, and get to the heart of behavior management in the heart of Texas.

Bigger is Better:
Efforts to Build a Flock of Blue and Gold Macaws at the Oakland Zoo

Leslie Storer, Darren Minier, Colleen Kinzley
Oakland Zoo

The Oakland Zoo has four male blue and gold macaws (Ara ararauna) ranging in age from 7 to at least 22. As is the case with many psittacines in zoos, all were previously unwanted and in need of a permanent home. Each bird came to Oakland at a different time with a different background. As of March of 2013, 2 males had a long history of affiliative behavior and were kept in a separate portion of the exhibit than another male who had recently lost his female mate, and 1 donated pet bird was about to join the collection. The team of keepers decided to encourage a more natural social group, so instead of keeping two separated pairs, each with access to only half of the exhibit, we would give all four birds access to the entire exhibit, in hopes of allowing them the choice of social interaction or not. We made the exhibit dynamic with moveable rope perches that connected the two formerly isolate perching areas. We also added novel watering stations, branches, and areas to easily attach enrichment devices. Thanks to the different personalities and personal histories of the individuals, introductions have been less than seamless. With the help of a volunteer behavior observation team, we continue to monitor the birds, and the keeper staff continues to modify the exhibit and our management strategy with the belief that a bigger flock is more natural, and therefore, better.



Four male blue and gold macaws currently inhabit the Oakland Zoo's macaw exhibit. Over the last year we have modified management practices and the perch structure, the latter of which also modified the social dynamic. In March 2013 social change was inevitable, because at that time we had a plan in place to add a new individual to the previous group of three.

Our four macaws come with varied backgrounds. The qualities they share are their species, their sex, and the fact that were unwanted. Bobaloo hatched in 1991 and arrived in 1997. His records indicate he was purchased from the Fresno Zoo. I was informed he was unsuccessful in their bird show. He had bonded with a female and the two exhibited nesting behavior, but she died a year earlier. When I started working at the Oakland Zoo in March 2013, his feather condition showed some signs of over-grooming in the neck and chest areas. He avoided the stick perch used for shifting. When a keeper approached with this stick, he would move away.

Bingo hatched in 1996 and was donated by a pet store in 1998. According to the records, the reason for the donation was that he was loud and screamed a lot. Aggressive behavior that Bingo often exhibited towards keepers and volunteers included open beak lunging usually preceded by facial blushing and ritualistic stretching of his wings. During designated training sessions, he knew a few behaviors on cue, such as a foot raise, but would lunge and bite the target pole. Hand-feeding Bingo small reinforcers, like sunflower seeds, was a risky endeavor, but larger reinforcers, like a peanut, could be safely delivered by hand

Paco hatched in 1994, was hand-reared, kept as a house pet, and in 2002 was donated by his former owners. As of March 2013 Bingo and Paco had a history of affiliative behavior. Paco was typically not aggressive towards keepers and volunteers, but he and Bingo would sometimes become aroused together and appeared to feed off of the others heightened state. Paco also knew some behaviors on cue and keepers were able to hand feed him something as small as a sunflower seed.

Rascal was the final birds to be added, the hope being that he would bond with Bobaloo. Rascal hatched in 2008 and arrived in 2013. He was donated by a family, his second, who had significant background information about him. We located and spoke to the breeder that raised him and learned that he was raised by himself and purchased by his first family. His upbringing raised our concern for his avian social skills. During his quarantine period, a hospital keeper and I worked with him. We were able to refine his manners, by teaching him not to communicate not through open-beaked lunging to get what he wanted , but instead to respond to a specific cue to receive a reinforce. We also taught him to stand calmly without lunging if he chose not to interact, and that we would not force the issue, but rather leave him alone. We taught him to step up on a hand or on a stick, on to and off of a scale, and to enter a crate and allow us to shut the door.

The exhibit was designed in 1965 for tigers (*Panthera tigris*), then modified in 1968 for lions (*Panthera leo*), further modified in 1991 for sun bears (*Helarctos malayanus*), then modified yet again 1993 for macaws. There two separate perch structures. Shade cloth was stretched across wooden frames for shade. Water sources consisted of four small silver bowls mounted on PVC frame. There are two enclosed shelters towards the back of the exhibit in which the birds spend the night.

The main exhibit modification is the addition of two 50 foot manila ropes extending from one tree to the other. The ropes are secured permanently to one tree, and a heavy-duty carabineer is affixed to the other end. This allows one end to move so the perches can change, and the perch structures can be combined or separated. Clips are semi-permanently attached at two points on each rope from which keepers can hang enrichment devices. Two ropes prevented any one bird from being easily cornered by the others. Large, shallow terra cotta dishes were the new water sources. They are set in cargo netting or woven canvas that is taut and suspended horizontally from the perches. Perches were added to extend into existing live trees, so the live trees would provide shade as well as more climbing opportunities.

Management protocols were slightly modified as well. The birds' pelleted diet and produce are offered in the night shelters, instead of on exhibit, where it attracted squirrels. Instead of seeds and nuts being offered with the rest of the diet, they are now offered numerous times a day during keeper interaction or in enrichment devices that encourage foraging. We emphasize reinforcing birds when perching in desired parts of the enclosure, like the perches, and ignoring perching in undesired but not dangerous parts of the enclosure, like on top of the night shelters. We emphasize ignoring Bingo's aggressive displays from a safe distance and eliminating his opportunities to rehearse aggressive displays. Formerly an aversive herding technique for shifting into night shelters was an option if the birds did not shift immediately. We now emphasize reinforcing shifting into night shelters, reserving aversive techniques only in the case of the most extreme emergencies. We chose to emphasize reinforcing being on exhibit and minimize the number

of times the birds were caught up in an effort to help maintain a positive relationship with the birds. We chose not to catch the birds up solely for the sake of wing clipping. None of the individuals are strong fliers. We agreed that if a bird were caught up for medical reasons or an emergency, only then would the wings be clipped.

For several months after the initial introduction, the keeper team relied on our volunteer Behavior Observation Team to continue to monitor the group's behavior. This team was instructed on how to identify the individuals, which behaviors to note and what they indicate, and how to contact us if immediate keeper attention was required. This team of volunteers has been instrumental in monitoring trends.

Not surprisingly, Rascal's behavior around the other macaws confirmed what we had suspected: he had no apparent knowledge of how to interact with conspecifics. Rascal spent no time with the other birds. Any time spent in close proximity to another bird appeared to be accidental at best and often unpleasant when Paco, the least tolerant of the new-comer, was involved. Rascal learned to avoid Paco. Occasionally Paco's aggressive behavior aroused Bingo, Paco's mate, and both would confront Rascal, lunging with beaks open. When not aroused by Paco, Bingo and Bobaloo seemed mostly tolerant of Rascal. Rascal's social skills were making flock formation very difficult, but there was one advantage: Rascal's enthusiasm for interaction with familiar humans made him easier to manage than the other birds, who, for various reasons, did not display the same level of enthusiasm. As time passed, Rascal learned how to avoid conflict, but we have observed no increase in the amount affiliative behavior with the other birds.

We employ several measures to provide a comfortable living space for all of the birds. Because the birds are, for various reasons, not flighted, flying to the next tree when one wants more personal space is not an option. Instead we make every effort to provide them with extensive horizontal complexity on exhibit, ensuring there is no way any bird can be cornered without the option of climbing away easily.

Environmental enrichment is an important tool to minimize conflicts. The old saying applies here, "Idle ~~hands~~ beaks are the devil's playground." We offer several opportunities throughout the day to acquire enrichment devices or to interact. Similar enrichment devices are offered in at least four different places at once to avoid any conflicts over resources. Each device is designed with the goal of engaging each individual for as long as possible.

While the immediate task of enclosure modification and introductions appears complete, our work will never be done. We continue to monitor the birds' interactions. We continue to enhance the enclosure. We continue to plan for the future, which includes a move to a new enclosure that would give them more opportunities to make choices about their own environment.

New Contexts for IB Model – A Mathematical Way for "Group Behaviors" Management

František Šusta, Katarina Kamasová, and Klára Vodičková
Prague Zoo

When training gregarious zoo-animals, the effort of every individual is influenced by relationships inside that group. Objective interpretation of these scenarios impacts our training success. A Ring-Tailed Lemur show in the Prague Zoo is done on a very dynamic animal group. For this reason we created a method enabling us to quickly assess the actual state of each member in the group and probability of his success in the coming show. We have devised a rating system that can be mathematically formulated. Each behavior in the show is rated by "index of balance" (IB), which we calculate from the following variables:

1) K - Does animal KNOW the behavior?
2) R - Expected REWARD
3) PA - Potential "to be ASSAULTED".
4) D - DIFFICULTY (also accessibility of resources).

The IB expresses the probability in percentage for potential success. We start the show with one special behavior out of visitor´s sight, and rate it using K, R. PA and D of each animal. This provides us with the information of the social condition of the group, and the opportunity to assure success of actual show.

During last year, this system, first presented at ABMA conference, has been tested on several animal groups and it looks to fit in many situations, including sea lions show management, horse training, food related enrichment as well as the author's personal dog consultant praxis. This is a great tool how "train trainers" to change their viewpoint and see what they ignored before.

Oakland Zoo Hyena Training: Successful Management of Three Separate Clans

Virginia Valentine
Oakland Zoo

In recent years, the Oakland Zoo's spotted hyena training program has adapted to several logistical and behavioral challenges. In September 2012, 2.1 young hyenas joined our existing 1.1 older hyenas. Due to age differences, the two clans were not fully introduced requiring modifications to our exhibit and night house. Training sessions usually occur in the night house and keepers rotate who has access.

By September 2013, the oldest male was receiving more injuries from the oldest female and displaying increased stereotypic behaviors. Keepers decided to separate them, creating three groups to manage. Logistical restrictions and the anxiety of our oldest male meant that the youngest group no longer had access to night house training sessions. Keepers adapted to accommodate this and continued regular training sessions.

In October 2013, keepers were told we had two months to revamp our shifting protocols again--the youngest female needed her birth control implant replaced, requiring she be anesthetized in the night house. The 2.1 young hyenas required night house access again, but the most difficult challenge was minimizing stress for the oldest male while achieving this. Through a lot of patience, planning, and behavioral observations, keepers were successful in this goal with minimal stereotypic behaviors from the oldest male.

In December 2013, the youngest female was successfully anesthetized by voluntary hand-injection in the night house and recovered well from her procedure. Our hyena training program continues to adapt to new challenges through exhibit flexibility, additional staff support, and continued animal training opportunities.

Introduction

In the last 2 years, the Oakland Zoo's spotted hyena training program has adapted to several logistical and behavioral changes. In early 2012, the Oakland Zoo was home to a pair of older 1.1 spotted hyenas Zoe and Dos Equis (ZD, ages 21 and 25). At that time, the Berkeley Hyena Project contacted the zoo about decreasing the size of their collection. Since the Oakland Zoo was looking to add younger spotted hyena to maintain our collection, this seemed like a good solution for both organizations.

After agreements were signed accepting three new animals, many modifications were made to the hyena facilities (night house and exhibit) in anticipation of their arrival (see Fig. 1). In September 2012, 2.1 young hyenas Harley, Ozzie, and Tusker (HOT, ages 6, 5, and 6) joined our existing 1.1 older hyenas on site. Due to their age differences and species-typical social characteristics, the decision was made not to integrate the two clans and to manage them separately.

After the 2.1 young hyenas (HOT) completed quarantine, keepers were able to rotate which clan had night house access. Both could be in separate parts of the exhibit and all five hyenas were visible to the public during the day. HOT were locked into the expansion yard overnight, while the older 1.1 hyenas (ZD) had exhibit/night house access overnight (see Fig. 2). Training sessions for both clans were held in the night house (see Fig. 3).

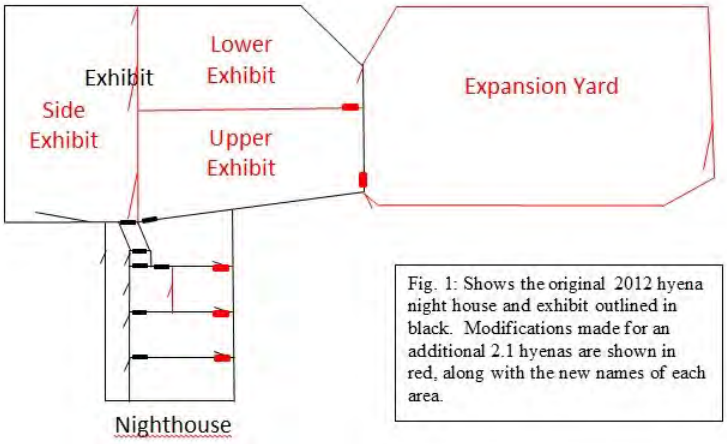


Fig. 1: Shows the original 2012 hyena night house and exhibit outlined in black. Modifications made for an additional 2.1 hyenas are shown in red, along with the new names of each area.

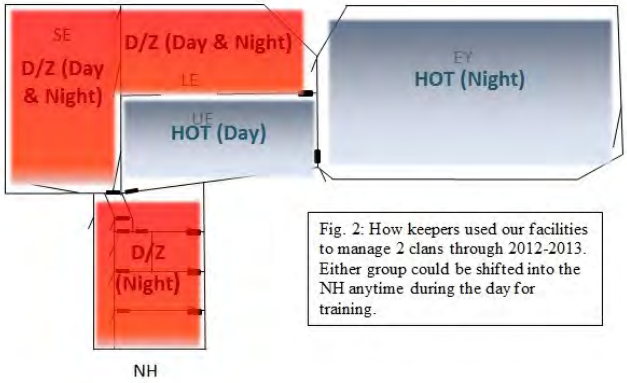


Fig. 2: How keepers used our facilities to manage 2 clans through 2012-2013. Either group could be shifted into the NH anytime during the day for training.

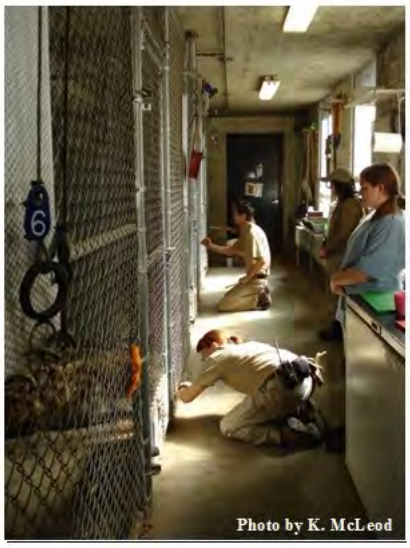


Fig. 3: NH training typically has 1 keeper per hyena, but since the animals can be separated into different stalls it is possible to train with a single keeper.

Choosing to Manage Three Groups

When the older and younger clans were given side-by-side exhibit access in Oct. 2012, the older and younger females displayed aggression towards each other. Keepers observed the females biting at the fence towards each other, digging at shared fence lines, growling, and running/following each other along shared fence lines. Zoe's digging was so destructive that she ripped up several sections of dog-proofing that had to be replaced. These interactions between

Zoe and Harley would often last for 10-15 minutes and then the young group would slowly move away focusing on other things in the exhibit. Zoe would remain focused on HOT for a few more minutes, then displace her aggression onto Dos Equis by chasing him. The chase would then excite the young group again. This pattern of events increased Dos Equis's stereotypic pacing and overall anxiety as observed through trembling, hesitance or refusal to shift through doorways, jumping at unexpected noises or movements, and difficulty recovering from stressful situations. Over the following 2 months, his anxiety decreased to a manageable level through medication and enrichment to distract Zoe and HOT.

In the summer of 2013, keepers once again saw that Dos Equis was exhibiting increased stereotypic pacing, losing weight, becoming unusually nervous, and receiving more injuries from Zoe. In the fall of 2013, Dos Equis's health and psychological problems escalated when he began showing intermittent neurological symptoms such as a droopy ear, slight head tilt, and inability to safely evade Zoe during chases (choosing to stop mid-chase even though he could outrun her). At this time, keepers, management, and veterinary staff started discussing his quality of life and the possibilities to improve it.

After finding no physiological reasons for his symptoms in Oct. 2013, it was decided that Dos Equis would be separated from Zoe in the hopes that this would improve his psychological well-being. By November, Dos Equis was showing drastically decreased pacing and anxiety and improved appetite and playfulness with both keepers and Zoe (through a fence). Training continued with ZD in the night house, but HOT could only be trained while they were in the EY (see Fig. 4). Due to logistical challenges, HOT could no longer have night house access once Dos Equis was being managed separately (see Fig. 5).





Fig. 4: After separating the older hyenas, HOT was only able to be trained in the EY. The steep hillside, erosion issues, and inability to separate the 3 from each other made training more challenging than in the NH.

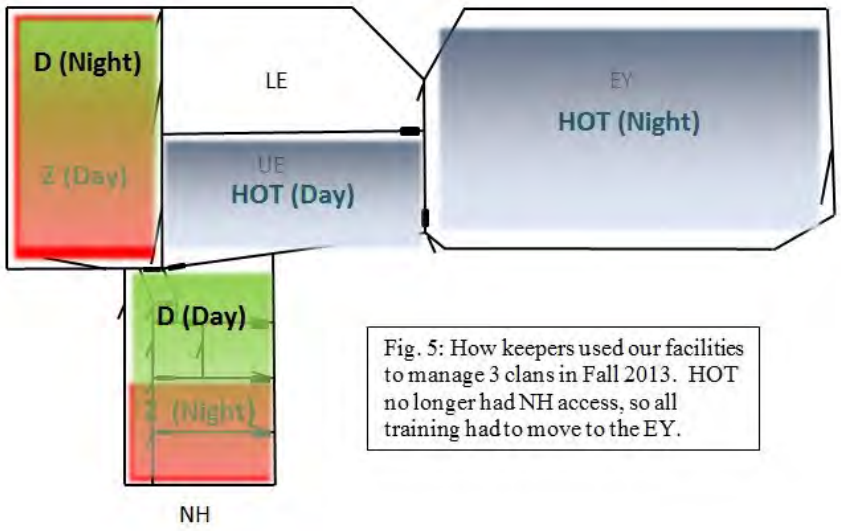


Fig. 5: How keepers used our facilities to manage 3 clans in Fall 2013. HOT no longer had NH access, so all training had to move to the EY.

Minimizing Anxiety During New Shifting Protocols

In the weeks after separating Dos Equis and Zoe, veterinary staff gave keepers a new challenge: in early December, Harley needed her birth-control implant replaced and the safest place to anesthetize her was in the night house. Other options were ruled out because of the steepness of the exhibit space and the corresponding risk of falling after being darted. Unfortunately, with the new setup HOT did not have night house access anymore. The implant replacement was time-sensitive and could not be postponed more than a week or two since waiting could cause Harley to go into estrus before the implant was changed, causing the two males with her to become increasingly aggressive towards each other while trying to breed with her. Additionally, Harley would need to recover from her procedure in the night house. Keepers also needed the young hyenas to have night house access for visual checks, the ability to separate them, and future medical needs.

Getting HOT back into the night house was a great challenge, but like any behavior, this new situation was broken down into small, attainable steps. All plans were made keeping in mind that any changes should be made with the goal of minimal anxiety for Dos Equis. His trust and comfort were earned through routine, consistency, and no surprises—he had to see everything new that happened. Since the psychological welfare of Dos Equis was a top priority, no new changes happened until an established pattern of little to no pacing was seen.

Additional exhibit modifications were not possible or within budget, so keepers worked within the given facility constraints. Starting in late Oct. 2013, we began the following steps to get HOT back into the night house (NH):

1) From their daytime on-exhibit locations, HOT is shifted and locked into the Expan sion Yard (EY).
This was already established.

2) Lock Dos Equis into the back, corner NH stall.
This was easily established, but has broken down intermittently and has taken almost 1 hour at times.

3) Establish a new NH recall cue for Zoe and shift and lock her inside NH.
The new NH recall cue was done 2x/day around Week 5 (see below) and accom plished over a few days. Her previous cue was kept for Dos Equis, so it now needed to be

changed so she wouldn't approach the NH after his cue (see Fig 6).

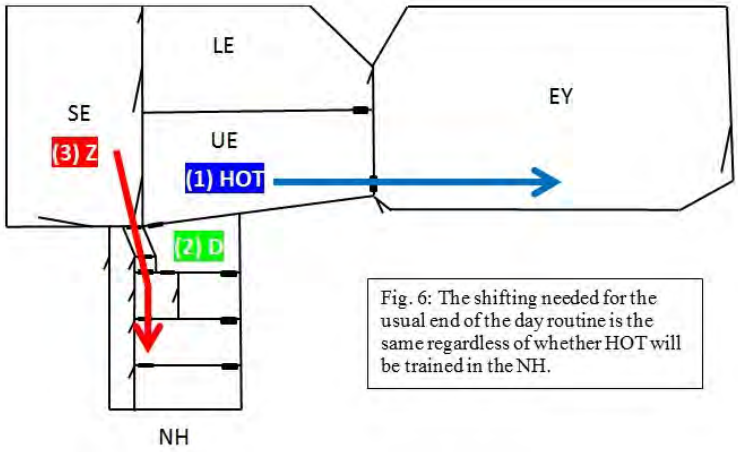


Fig. 6: The shifting needed for the usual end of the day routine is the same regardless of whether HOT will be trained in the NH.

4) Dos shifts outside into the Side Exhibit (SE) and is locked out of the NH.
This was already established.

5) Zoe shifts outside into Upper Exhibit (UE) and Lower Exhibit (LE) and is locked into LE.

This step took many forms and lasted several weeks for Dos to be comfortable, able to rest, and not show stereotypic pacing or anxious behaviors. Every step required observations to monitor his pacing during whatever shifting changes were happening.

Week 1: Three sessions of Dos Equis locked out into SE and Zoe locked out into UE. He was seen pacing, trembling, and running in fear. Dos Equis would start pacing quickly into the sessions, so they were ended within 1 hour.

Week 2: Four sessions of Dos Equis with SE and NH access and Zoe locked out into UE. NH access was given to him to provide a safe place to retreat. Dos Equis started pacing outside, near the open NH door, but would not enter or exit the NH if Zoe was within 40 feet of him and did not remain inside for long. He was very wary of going into NH. Sessions only lasted about 1 hour.

Week 3: Three sessions of the same setup for 2 hours each. Dos Equis was more comfortable going in and out of the NH, but would pace intermittently outside.

Week 4: Since Dos Equis did not seem to be acclimating to Zoe in the UE, even with NH access, keepers decided to move her further away from the NH and give her access to the LE. 2 sessions this week: one with Dos Equis locked into NH and giving Zoe access to LE (for the first time) which she enjoyed exploring. The second session was Dos Equis in SE with NH access, watching as keepers gave Zoe access to LE. Dos Equis was not pacing for the 1 hour of observations. Keepers tried ending the session by doing a NH recall after 20 min (to end on a positive note), but Dos Equis was focused on Zoe. After an hour of being on exhibit and watching Zoe, he calmly came into NH on his own and the session was ended.

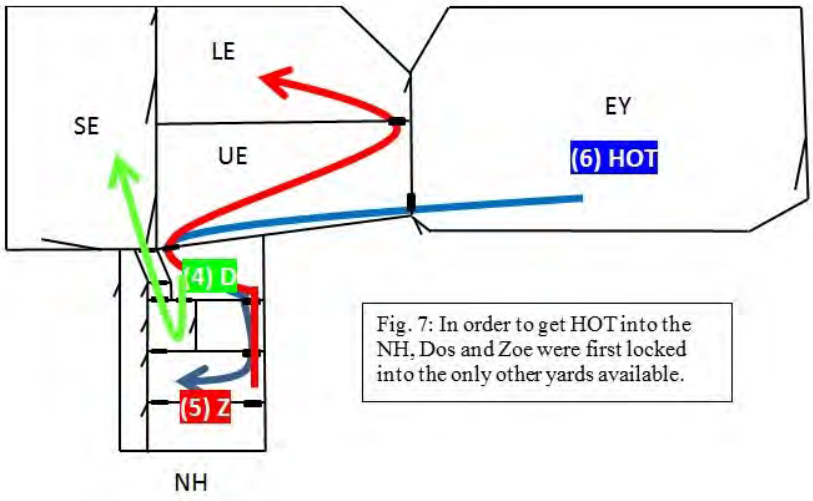


Fig. 7: In order to get HOT into the NH, Dos and Zoe were first locked into the only other yards available.

Week 5: Four sessions to continue desensitizing Dos Equis to being in SE/NH with Zoe in LE/UE. Decreased pacing and anxious behaviors were seen from him compared to last week, but he was hesitant to go into the NH. A new NH recall cue was taught to Zoe.

Week 6: Four sessions with observations, but ZD were left in their new setup overnight, with Zoe was also locked into LE overnight. Dos Equis was very alert during these times. The longest bout of pacing was 20 minutes, during 1-2 hour observation periods, but he would generally relax after 30-60 min. Zoe is very food motivated, so locking her down into the LE overnight was established this week by leaving a "meat trail" by the necessary shift gate and most of her food down in the LE. Her new recall cue also needed strong reinforcement this week when being recalled to the NH from a new yard. This new setup continued for the next 3 nights, with no formal observations. Keepers would have preferred to continue this for another week with no new changes, but we pushed ahead since our minimal pacing criteria was being met. Prior to Week 6, Zoe had been locked into the NH overnight for the previous 2 months.

6) HOT shifted from EY through the UE into the NH.

Week 7: New overnight locations for ZD continued every night. Two sessions with 2 hours of observations of Dos Equis locked out into SE, Zoe locked into LE, and HOT given access to UE and NH (see Fig. 7). Their previous recall cue was not used to minimize

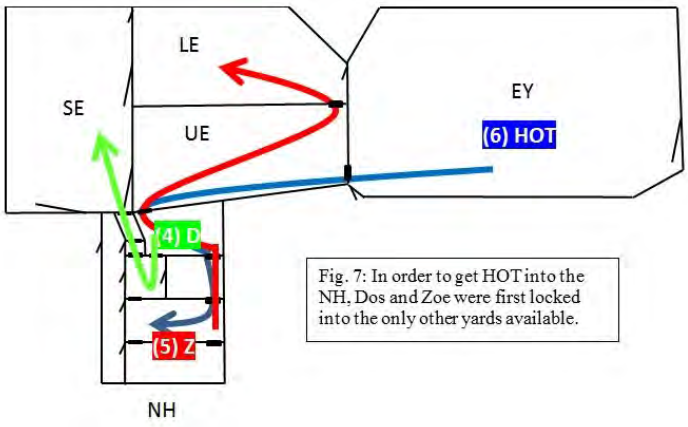


Fig. 7: In order to get HOT into the NH, Dos and Zoe were first locked into the only other yards available.

their excitement. Before shifting HOT, keepers called to Dos Equis and made sure he could see HOT shifting. HOT ran right into the NH, where another keeper was waiting to close them in and limit their time out in the UE to minimize anxiety for Dos Equis. When HOT came into the UE or exited the NH, Dos Equis ran away from them, but would then turn to watch them and the NH. Around 30-40 min of pacing occurred after HOT returned to the EY and Dos Equis was given NH access, but then he would sit down and rest. No NH training sessions happened with HOT this week.

If this step had not been successful, keepers and vets were considering sedating Dos Equis on exhibit 1-2 days in advance of the procedure.

7) NH Training sessions with HOT

Weeks 8 and 9: There were 5 NH training sessions with HOT over 2 weeks, then they were immediately shifted back to the EY. HOT training sessions happened every other day, to have a "rest" day for Dos Equis. Observations of Dos Equis showed that he was alert, but not as nervous as in the past few weeks. There was no pacing seen during or after HOT was in the NH and he was relaxed enough to lay down 20-50 minutes after being given NH access again. Formal observations ended at this point and haven't been necessary again.

8) Shift HOT back to EY & 9) Give Dos Equis NH access

These steps complete the day's shifting. Both steps were already established. (See Fig. 8)

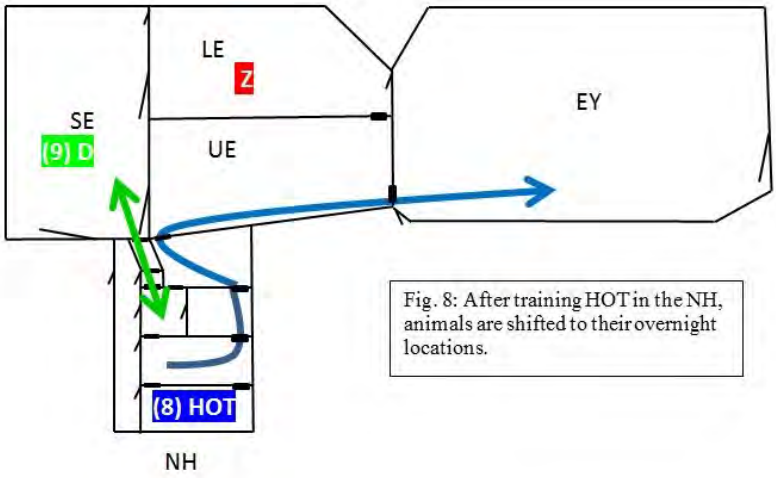


Fig. 8: After training HOT in the NH, animals are shifted to their overnight locations.

Voluntary Hand-Injection of Anesthesia

Before HOT lost night house access, Harley had a well-established--but never implemented --injection behavior meant for a postponed vaccination. Prior to creating the training plan, the senior veterinary technician was consulted for the ideal position of Harley in the NH and the preferred body part. The amount of vaccination (and thus duration of vaccination) and force of the injection were also discussed, with the primary trainer getting poked in the arm as hard as Harley would be for her injection.

All training sessions last about 5 minutes, using half of each animal's daily meat (Natural Balance 5%) and 1 cup of Hill's Prescription R/D dog kibble as a low-calorie addition to extend the amount of food available for training. Harley's lean-in was shaped in less than 10 session, us-

ing cinder blocks parallel to the fencing to help line her up correctly. Duration of the lean-in and injection were both shaped over an additional 17 sessions—three of these with the vet tech who would give the injection and eight sessions with an intern as her stand-in (see Fig. 9).



Fig. 9: An intern was trained and stood in for our vet tech as a 2nd person. Any 2nd person was closely coordinating with the trainer.

While the new shifting routines were moving along slowly, Harley's injection behavior continued to be trained outside in the EY but only 1 or 2x/week. HOT had 7 total sessions out in the EY through Oct.-Nov. 2013, and only 4 of these included the lean in/injection behavior. Harley's cinder blocks were put out in the EY to help generalize the behavior to a new location and she returned to her previous progress within 2 sessions. Once Harley had NH access again, she had a total of 6 sessions to turn the vaccination behavior into an anesthesia injection behavior.

Out of these 6 sessions, the first 3 focused on being locked into the NH chute—which Harley had never done before—and reviewing the injection behavior. The last 3 sessions focused on chaining the injection and chute. Jackpots were initially given while Harley was locked in the chute, but then her only food reward was pushed back to after she was released from the chute. This was to help normalize not receiving any food throughout the entire behavior, as it would have to be on procedure day.

In the end, Harley did splendidly for her first injection and was successfully locked into the chute and monitored by hospital staff. She had been given 4 individual pieces of blood-soaked dog kibble through the entire process to have some food reinforcement for the behaviors. Ozzie and Tusker were in the NH until Harley was removed, then shifted out to the EY. They were allowed to return at the end of the day for side-by-side reintroductions after Harley was awake. Dos Equis and Zoe were locked out of the NH overnight and no stereotypic behaviors were seen from either. Harley returned to her previous lean-in progress within a month of her procedure. The cinder blocks have since been phased out of the behavior and longer duration continues to be a goal.

Conclusion

Since Oct. 2013, Dos Equis has begun eating consistently and is food-motivated enough to train which had not happened since HOT's arrival. Attempts of training with scratches as reinforcement had minimal success. His weight has gone from a low of 89 lbs just before he was separated from Zoe to 126 lbs in March 2014 (see Fig. 10). He is playful with keepers and has daily species-appropriate interactions with Zoe through a fence. Dos Equis continues to show little to no stereotypic pacing, though he has intermittent nervous reactions to NH shifting and needs to be alerted in advance of any shift door movements. Keepers continue to be mindful of consistency and avoiding any surprises for him.

HOT continues to have NH training sessions 1-2x/week and shortly after Harley's proce-

dure, both Tusker and Ozzie successfully received vaccinations by voluntary hand-injection in the NH. Keepers are happy and excited that we can balance the mental welfare of one animal, without compromising the safety and health of others, though shifting HOT into the NH for training adds about 30-60 min to a keeper's work that day.

Long-term plans for our hyena management include giving Zoe overnight access to the LE, UE, and NH, while Dos has SE and NH access overnight. The two older hyenas will not be reintroduced to each other in a shared space.



Fig. 10: A happy and healthy Dos Equis enjoying enrichment in his own yard, March 2014.

Acknowledgements

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Maria Trenary and the Oakland Zoo Veterinary Hospital staff- For their help training the injection behavior and taking such good care of our hyenas

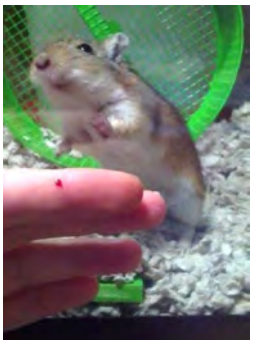
String 8 interns and volunteers- For their hard work which allowed keepers to focus on this issue and their behavioral observations. A special thanks to Courtney Arndt for being my stand-in vet tech for so many weeks!

Small Animals Matter - The Story of Bil

Megan Phillips
Train with Trust Behavior Consultants LLC

In the summer of 2013, a young male gerbil was surrendered to the pet store where he was purchased by his owners who were unable to continue caring for him due to his aggression. He was indeed an extremely fast and aggressive biter, so I decided to adopt him, work to gain his trust and try to modify his aggression before eventually re-homing him. The first steps would be to devise methods of feeding him and cleaning his cage without getting bitten. Next, he would need adequate enrichment and exercise to provide an outlet for his energy. Clicker training and all manner of chewable items provided the basis of the enrichment program. As Bil settled in, we determined that although human hands were the major proximate trigger of Bil's biting behavior, he actually found manipulation of his resources and environment more aversive than petting. A long period without exposure to human hands set the stage for modifying Bil's biting, which is still a work in progress. However, through the process of building a protected contact relationship with Bil, the primary goal shifted from modifying his biting response, to allowing Bil to become an ambassador for the great potential of "hands-free" relationships with small animals. Bil is now the star of Hamster Derby seminars hosted by the pet store to help small animal owners fully appreciate and enjoy the pocket pets in their care. And, perhaps needless to say, re-homing Bil is no longer under consideration.

Introduction



In the summer of 2013, a young male gerbil was surrendered to the pet store where he was purchased by his owners who were unable to continue caring for him due to his biting when they serviced his cage or tried to pet him. His biting was indeed extremely fast and aggressive, so I decided to adopt him, work to gain his trust and try to modify his biting before eventually re-homing him. The first steps would be to devise methods of feeding him and cleaning his cage without getting bitten.

Materials & Methods

I created a treat cup by attaching a coffee scoop to the end of a plastic drinking straw. This way I could deliver food items without having my hands invading his space. I determined a good daily base diet (rodent block) amount and some favorite treats (crackers, edamame beans and bread) and started training.



Bil needed a "crating" or "shifting" behavior so that he could be removed from his home environment safely and without stress. Initially "free" treats were offered in a hamster ball to form a positive association. Then I progressed to clicking and providing a treat after he had entered the ball. While he ate I gradually began bringing the lid closer to the opening of the ball until I could secure it in place and remove it. I gradually increased the duration that Bil was in the ball & removed from his home. I was able to open the lid and provide additional treats during longer durations. Crate training was completed and I was able to clean Bil's habitat after about 7 days. Cage cleaning was made less aversive by always replacing some bedding and some items which still contained his scent. I didn't completely wash and replace everything every time.

The next goal was to provide Bil with enrichment to encourage natural behaviors and encourage mental and physical activity. Because gerbils tend to hop rather than run, the hamster



ball and running wheel were not very effective for encouraging activity, Nest building was Bil's main motivator and favored activity, so I soon discovered that it was very effective to let him work for his bedding materials as well as his food and treats. I used paper towel and toilet paper rolls, as well as (non-corrugated) cardboard boxes most commonly. As Bil got good at shredding those, I would hide food block and treats as well as additional bedding materials inside. Commercial chew toys including bird toys were also very effective. The enrichment plan gave Bil not only activity but also a lot of opportunities for choice and control in his environment. In effect, he was able to spend a large amount of time creating his own bedding materials and arranging his environment to his own specifications.



Initially all enrichment was provided and removed using salad tongs to prevent any bites and any negative associations with hands invading the environment. I gradually began providing enrichment by hand as Bil became more comfortable, but kept hands always at a safe distance and as a brief exposure.

Clicker training was another successful enrichment tactic. Bil learned quickly. I started by capturing a behavior he offered frequently, placing his paws on top of his ceramic cage furniture. He then learned to touch his whiskers to a target, follow target, jump through a hoop, and run across a teeter-totter. I also clicker trained moving away from my hand as I reached into his environment. Once the reinforcement was delivered and Bil was eating, I was able to desensitize my hand invading the environment as I provided, removed and replaced enrichment items.



Conclusions

Although working with Bil to allow touching and handling were early goals, they are still a long way off and may or may not still be future goals. What came from my experience of building a protected contact relationship and providing a good quality of life for Bil is an inspiration to share these ideas and techniques with others. As a behavior consultant for pet owners, Bil has inspired a series of seminars and workshops to help owners of small animal pets appreciate and understand the needs of these creatures. Many owners want to be educated and empowered to provide an enriched and high quality life for their pets. This little Ger-Bil has provided me all the inspiration I need to go out and reach them.

Firehoses Do More Than Fight Fires!

Micala Teetzen
Sedgwick County Zoo

This poster details some of the numerous and unique ways in which Sedgwick County Zoo utilizes firehose. Examples include: "vines" with leaves that can be filled with treats, wide-width woven firehose pathways, various shapes of hammocks, PVC framed beds, "refrigerator strip doors" to keep heat in holding areas when animals have access and numerous enrichment devices (hay nets, firehose animals, boondoggles, etc.) Instructions for making several of the items are included. The poster also shares some tips on working with firehose such as the best tools for cutting it and easiest and safest way to make holes in it and even how to easily "skin" an entire roll of firehose to remove the inner rubber layer!

Enrichment Uses

Firehose animals. Make heavy "carcasses" for predators such as large cats to carry around. See Photo 1. Instructions are included in Appendix A.

Firehose hoops. See Photo 2. Instructions are included in Appendix A.

Boondoggles. These firehose boondoggles stretch over time creating perfect places to hide treats, hang browse, etc. See Photo 3. This was made using the "square stitch" (first you need to start with a "starter square stitch"). Instructions are included in Appendixes B and C. Visit www.boondoggleman.com for other stitches.

Haynet. This is an elephant-size version that holds an entire bale of hay. See Photo 4.

Spinning firehose barrel. A simple enrichment device made by running a piece of firehose through a hole in the bottom of an open-ended plastic barrel and tying a knot on each end. The firehose should be a foot or two longer than the length of the barrel, so that the animal can grab either knot and run with the barrel spinning behind them. See Photo 5.

Furniture Uses

Hammocks. Firehose hammocks can be made in a wide variety of shapes and sizes. For exam ple, there are tight-weave hammocks, loose-weave hammocks, square, rectangle or train gle-shaped (See Photo 6) hammocks. Here are some of our unique designs.

Papasan hammock. To create this hammock, the woven pieces are looped around the support section of hose so that they can slide (as opposed to attached in place along the cross piece). This allows them to sag together creating a comfy Papasan-like chair. See Photo 7.

Branch hammocks . These have a slightly more natural appearance. Simply weave the hammock into a Y-shaped branch. This is perfect for smaller mammals such as lemurs, but can also be done on a larger scale for apes or cats. See Photo 8.

PVC pipe can be inserted in the "arms" of hammocks to stiffen them if entanglement is a con cern. See Photo 9. This was done in our black bears' (*Ursus americanus*) well-loved ham mocks. Our male LOVES to play with his hammock and would potentially get his leg wrapped up in the long arms of his hammock if we hadn't stiffened them with PVC. See Photo 10.

Beds. Firehose can be woven on a wood, metal or PVC frame for a lightweight and comfortable bed. See Photo 11.

Woven paths/vines

Wide-width firehose pathway. This is essentially a very long narrow hammock attached in sev eral places along the length to create a rolling pathway. See Photo 12. Gorillas (*Gorilla*

gorilla) use it for locomotion and napping.

Woven vine path. This vine is made by weaving one firehose back and forth in a figure eight bet ween two straight firehoses. See Photo 13.

"Browse hanger weaving." This is an extended version of the "browse hanger weaving" devel oped by Keoni Pappas of Honolulu Zoo. See Photo 14. Four full-length rolls of firehose were used to create each section. Practice your weaving skills with ribbon or strips of pa per. Instructions are included in Appendix D.

Vines with leaves. Short pieces of firehose are cut into leaf shapes and attached to the vine with a bolt, leaving the bottom side of the leaves open. The firehose is then twisted to make it look more like a vine. See Photo 15. Treats or diet items can be hidden inside the leaves to encourage foraging and/or they will randomly fall out when the vines are moved.

Other Uses

Strip Doors. Similar to refrigerator strip doors that keep the cold air in walk-in freezers, strips of firehose are hung in doorways to off-exhibit holding areas. Weights can be added to the bottom of each strip to keep them taut. We bolt scraps of metal just inside the bottom of each strip for this purpose. These can be used with a variety of doors types (guillotine, sliders, Dutch doors, etc.). See Photos 16-19. It is also easy to customize the strip doors de pending on the size of the door opening and the species you are making it for. For exam ple, we have tiny 30 cm x 30 cm doors into our heated Tammar wallaby (*Macropus eugenii*) houses that have strip doors made from lightweight firehose.

These strip doors serve numerous purposes including:

- Keeping heat or cool air inside the buildings when the animals have access
- Deterring birds or waterfowl from getting inside and eating grain or meat diets, building nests or just leaving behind a mess
- Fly spray can be sprayed on the strips to help keep flies out and the fly spray will also rub on the animals as they enter/exit through the strips.
- You will need to monitor new animals as they are introduced to strip doors to make sure they are comfortable entering the holding area. You may need to remove a few of the center strips until they are accustomed to the strip doors.

Drain pipe. Another way Sedgwick County Zoo uses fire hose is as a drainpipe to direct water away from our holding buildings. See Photo 20.

Tips for working with firehose:

A serrated knife cuts through firehose like butter. See Photo 21. It is far easier and safer than using a utility knife or sawzall and more practical than bandsaw.

A cordless drill is the easiest way to make holes in firehose. However, it is very dangerous to use a drill if you are making a hole in the last few inches of a piece. The drill gets bound up and will wrench your wrist. To make a hole close to the end of a section of firehose, sandwich the firehose between two scraps of lumber, stand on the top of the lumber to hold it securely, then drill through the top piece (or a previous hole in the top piece) and the firehose. See Photo 22. Alternatively, a pocket knife blade also works to make a hole. See Photo 23. Just make sure you have a blade that locks in position for safety.

You can "skin" double-layered firehoses to remove the inner rubber layer. The advantages of this include: it is easier to work with, you will end up with a product that is much lighter in weight and it will prevent rubber ingestion in species where that is a concern.

Steps to "skin" a firehose:

Clamp to the outer cloth layer to a sturdy structure such as a doorframe .
Use a second clamp to secure the inner rubber layer to the bed of a golf cart.
Drive forward slowly, pulling the layers apart as you go. See Photo 24.
A short piece of firehose was used for demonstration purposes, but an entire 15.24 m roll can be skinned in this manner, you just need to make sure you choose a location where you can drive forward 30.5 m!

References

Pappas, K. (2005). Browse Hanger Weaving. Retrieved from http://www.honoluluzoo.org

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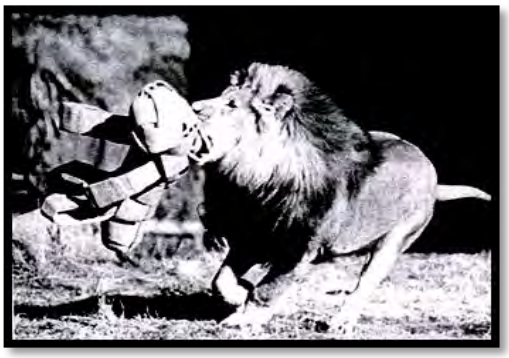


Photo 1: Firehose animal



Photo 2: Firehose loop

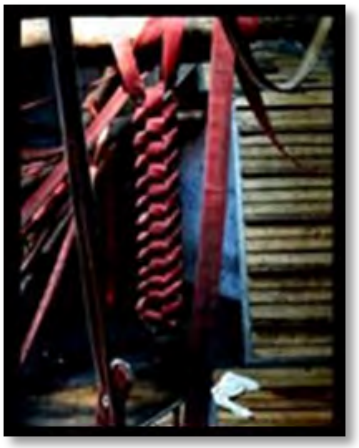


Photo 3: Boondoggle



Photo 4: Haynet



Photo 5: Spinning barrel



Photo 6: Triangle hammock



Photo 7: Papasan hammock



Photo 8: Branch hammock



Photo 9: Slide PVC inside fire hose



Photo 10: Hammock with PVC in the arms



Photo 11: Fire hose bed on PVC frame



Photo 12: Fire hose pathway

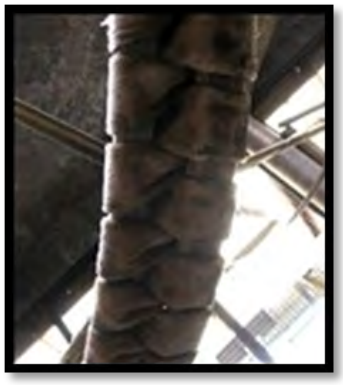


Photo 13: Woven vine path



Photo 14: "Browse hanger" weaving



Photo 15: Vines with leaves



Photo 16: Guillotine door

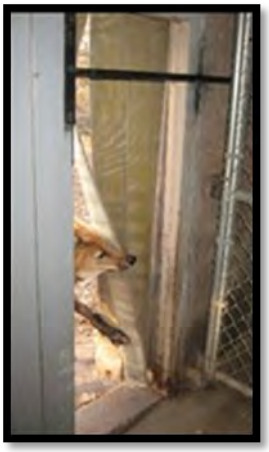


Photo 17: Slider door



Photo 18: Metal scrap weights bolted inside



Photo 19: Dutch doors



Photo 20: Drain pipe



Photo 21: Serrated knife



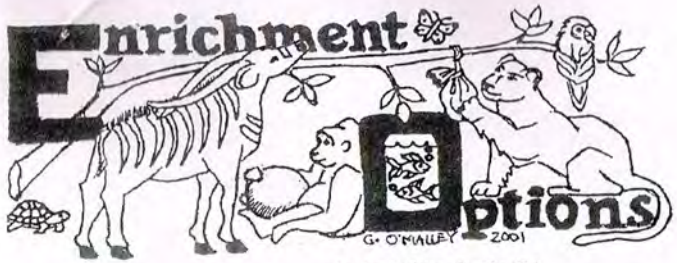
Photo 22: Sandwich between boards for drilling



Photo 23: Pocket knife



Photo 24: "Skinning" fire hose using a golf cart



By Jan Roletto, Eureka, CA
and Dawn Neptune, Utah's Hogle Zoo

Firehose Animals

Submitted by: Micala and Danelle Teetzen, volunteers at Sedgwick County Zoo, Wichita, KS

Credit for this idea goes to Keoni Pappas, author of "New Uses for Old Firehoses" (*Shape of Enrichment*, August 2002). This article had several good ideas for using firehose to make enrichment, but we were disappointed to find no specific directions on making the items described. So we set to work on creating a "firehose animal," relying primarily on a photo from the article. Through trial and error, this is what we've come up with.

How to Make a Firehose Animal

You will need: 2 rolls of firehose (most fire stations will donate their old hoses)
Sharp utility knife or serrated knife

1. Use a knife to cut the ends off of the firehoses.
2. Fold the hose back and forth 10 times at approximately 90cm (3 ft.) lengths. See Figure1.

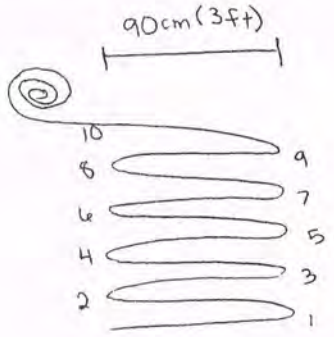


Figure 1.

3. Split into two stacks of five (5) layers each and place stacks side by side. See Photo 1.
4. Use the remainder of the hose to wrap the body fairly loosely. (This will make weaving easier later.) See Photo 1. Tuck the end into one of the folds.

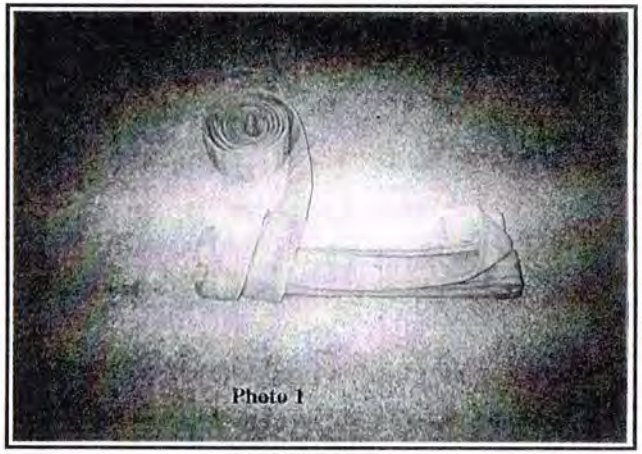


Photo by Micala Teetzen

5. Fold the second firehose back and forth as shown in Figure 2 to make the legs. The folds should be about 120 cm (4ft) long.

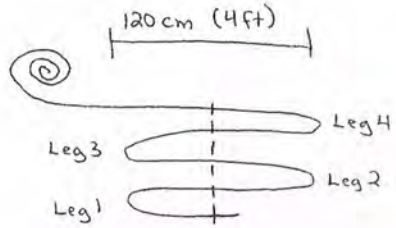


Figure 2.

6. Pull the legs through 4-5 of the middle sections of the body. See Figure 3.
7. Use the rest of the roll to weave around the body. Make sure that the hose isn't twisted before starting each weave. Weave over-under-over-under around the sides of the body, alternating the pattern of neighboring strands to create a basket-like weave. You should have enough hose to weave twice around the sides of the body and once or twice around the top and bottom sides. Run one weave on the bottom side between the pairs of legs to separate them. See Photo 2.

Animal Keepers' Forum, May 2003

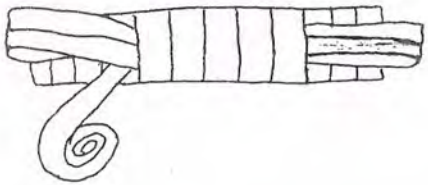


Figure 3.

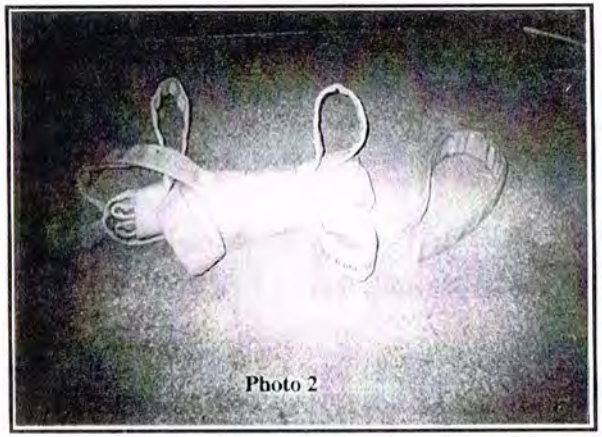


Photo by Micala Teetzen

8. If you have hose left over, you have several options. You can cut it off using a knife. You can leave the hose as is and use it to hang the animal. The third option is to make head. To do this, create a big knot and loop through it a few times to securely attach it to the body. See Photo 3.

The firehose animals work well with any big cats. They would also be suitable for bears, wolves, hunting dogs, etc. They are fairly naturalistic in appearance and allow the visitors to see the strength of the animals as well as natural behaviors such as stalking and dragging the "carcass" without all the blood of a real carcass feeding. See Photo 4. We have also adapted this concept for smaller animals by making a half-sized version using only one firehose.

Other toys we have produced include a weaved cube and a hoop. The cube can be solid or hollow inside. Large hoops are ideal for elephants or big cats. For these, it is easiest to start with a wide firehose to make the base for the hoop. (If you don't have one, you can double the width of a thinner hose by making two hoops and stacking them on top of each other for a base.) Use a second hose to wrap around the entire hoop. See Figure 4. Then weave 2-3 times around the outside of the hoop.

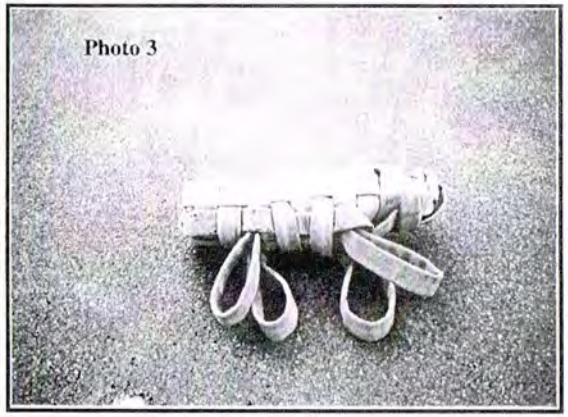


Photo by Danelle Teetzen

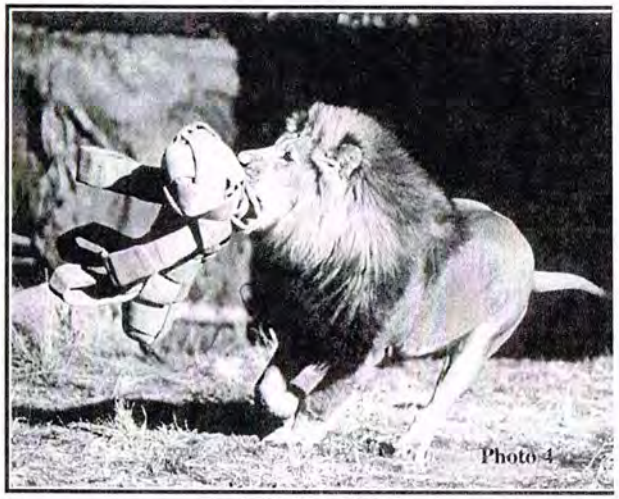


Photo by George McCandless

A word of warning: Be careful where you store these creations, since mice seem to enjoy nesting inside of them. If they are stored near rat poison, some may find its way inside via the mice, posing a hidden danger to your animals.

Any of the types of firehose toys can be hung from a garage door spring (enclosed in PVC pipe as a safety precaution) for more of a challenge. Other ideas include tucking produce or treats into the finished products, or it can be sprinkled with spices or perfumes. Firehose is very durable and therefore reusable. When your animals unravel one toy, you can make it into a new one.

The possibilities are endless!

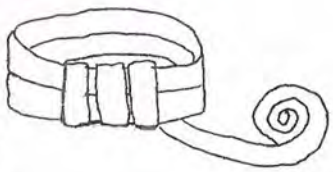


Figure 4.



Photo by George McCandless

(Ideas appearing in this column have not necessarily been tested by the editors for safety considerations. Always think ahead and use good judgement when trying new ideas. You are invited to submit materials for the Enrichment Options Column. This might include recipes, toys, puzzle feeders, olfactory enrichment ideas, etc. Drawings and photos of enrichment are encouraged. Send to: AKF/Enrichment, 3601 S.W. 29th St., Suite 133, Topeka, KS 66614-2054. Eds.)

Appendix B

Boondoggleman.Com

WHAT'S NEW?
August 23rd, 2010
WHO AM I?
BOONDOGGLE?
MAKE SOME!
SOME IDEAS!
WHAT COLOR?
BUY SOME!
QUESTIONS?
EXCHANGE!
PRIVACY!

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Starter Square Stitch

Learning how to START the Square Stitch goes FAR BEYOND simply being able to do the Square Stitch. This opening stitch is also used to start Circle, Combo, Fishy, Dragonfly, and a BUNCH of other stitches!

Before you begin, you'll need to FIND THE CENTERS of these strands...



Holding the strands at their centers, turn one of the strands, so that it crosses the other strand...



Hold this cross with your thumb to free up your other hand...



Take one of the strands and flip it up and over the crossing strand...



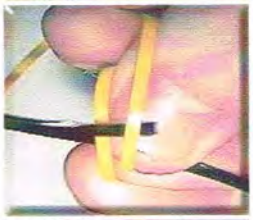
This will create your first LOOP, and should look like the left...

Now grab the other end of this strand and flip it up and over from the other direction...





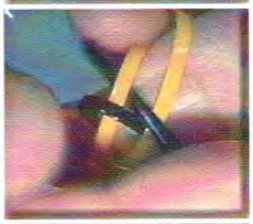
This creates your second LOOP, and should look similar to the left...



Now comes the WEAVE. Take the strand at your LEFT and place it OVER the first LOOP and UNDER the SECOND loop...



Which should look something like the left...

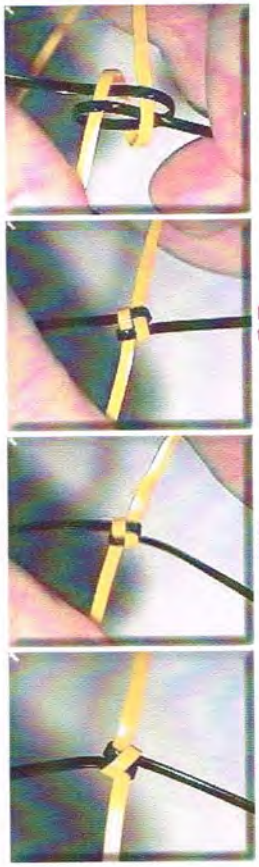


We're almost done! Take the strand at your RIGHT, pass it OVER the first LOOP and UNDER the SECOND loop...



Sorta like this...

Now comes the PULLING! Slowly begin to PULL the strands to create the first stitch!



Pull them TIGHT, but not TOO tight! If you pull them too tightly, you may SNAP the strands...

Here's what the finished opening stitch should look like...

...and if you turn it over, you'll notice the BOTTOM of the opening stitch looks like this!

Return to Starting Stitches

The Basic Stitches - Boondoggle Projects - Finishing Stitches

TOP

Content found on these web pages are the sole creation of David Weeks, aka Mr. Boondoggle Man!
Send me Email, if you'd like! Parents, read my Privacy Statement , then read about me!

Appendix C

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WHAT'S NEW?
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The Square Stitch



Sometimes referred to as the "Box Stitch", the Square Stitch is the cornerstone of all boondoggling stitches. To start this stitch, you'll need two strands of boondoggle the same length. With practice, you'll begin to figure out how much square you'll be able to do with any given length of boondoggle. For myself, I can get about an inch of square out of every 12 to 14 inches of strand.

First, FIND THE CENTERS of these two strands...

Create a STARTER SQUARE STITCH before continuing...



Hold a "starter square stitch" as shown. Bring the far strand up and over to form the first LOOP...



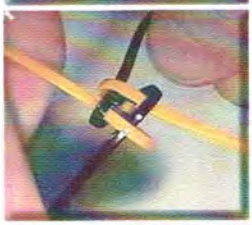
Now take the near strand up and over AWAY from you to form the second LOOP next to the first.



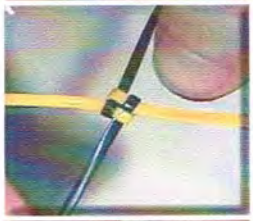
Start the WEAVE by taking the strand on your LEFT up and over the first LOOP, then under the second LOOP...

...continue by taking the strand on your RIGHT up and over the loop nearest it, then under the loop farthest from it, as shown.





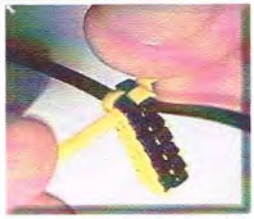
Slowly pull the strands away from each other...



...to finish the second square stitch!



After we've completed numerous stitches...



...here's the bird's eye view, ready to start another stitch.

There is another way to do the Square Stitch, which can make it FASTER to do this stitch. A similar method can be used when doing the Circle Stitch, however these are the only stitches that this method works with:



Start by making a loop, similar to the way you would normally start this stitch...

...instead of making a second loop, take the strand NEXT TO the strand you were working with UP



and OVER the loop you just made, so it sits next to the third strand...



...similarly, take the third strand UP and OVER the second strand, so it sits next to the last strand...



...complete this stitch by taking the last strand UP and OVER the third strand, then UNDER the loop you made with the first strand.

You would then pull the strands tight and complete the stitch!

Continue working the Square Stitch until the SHORTEST working strand you have is between 2½ and 3 inches long, then do a COMPLETION STITCH to finish off the project.



A Square Stitch Project, properly completed!

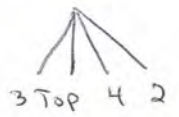
Return to Basic Stitches

Starting Stitches - Boondoggle Projects - Finishing Stitches

TOP

Content found on these web pages are the sole creation of David Weeks, aka Mr. Boondoggle Man!
Send me Email, if you'd like! Parents, read my Privacy Statement , then read about me!

Appendix D



Left under 1 V shape
Left under 2 Goes straight across
Right under 1 V shape
Right under 2 Goes straight across



BROWSE HANGER WEAVING



Step 1
- ~~Cut a full roll of fire hose in half~~ Use 4 full rolls
- ~~Cross strips in center~~ (horizontal on top of vertical) Bolt them together as shown
- Fold bottom half of vertical strip up, forming a 'V' as shown



Step 2
- Fold left strip under first strip to the right
- Lay along side next strip as shown



Step 3
- Fold left strip under first strip to the right, and over the strip next to the first
- Lay along side next strip as shown



Step 4:

- Fold left strip under the first and second strip to the right and over the remaining strip
- Lay out as shown



Step 5

- Fold right strip under the first strip to the left and over the strip next to first
- Lay out as shown



Step 6

- Fold right strip under the first and second strip to the left and over the remaining strip
- Lay out as shown



Step 7

- Repeat steps 3 thru 6 until out of hose or desired length



Step 8
- Bolt middle strips together
- Cut ends off middle strips



Step 9
- Bolt outer strips together
- Cut end off middle strips



Hang in exhibit with chain
Tuck browse or treats in weave

Can be used with Primates, Giraffes and Parrots

Eau De Tigres: Specialized Scent Enrichment for Managing Tiger Behavior and Physiology

Stephen Leavelle, Corinne Pisacane, and Lance Miller
Rhodes College

*The heart of animal behavioral management is seeking to increase animal welfare. For animals in zoos one method of enhancing welfare is through environmental enrichment. Carnivores have a heightened sense of smell, but the effects of scent enrichment on carnivores in zoos have been tested in limited fashion. This study monitored the effects of a new species-specific scent developed by San Diego Zoo Global on six Sumatran tigers (*Panthera tigris sumatrae*) located at the San Diego Zoo Safari Park. Behavioral data were collected for three weeks without the scent enrichment and then for three weeks with the scent applied daily to the enclosure at randomized locations. Tiger fecal samples were also collected from each tiger for analysis of glucocorticoid levels. Between the control period and the experimental period, there were significant increases in the diversity of observed behaviors, the occurrence of exploratory behaviors, and the amount of exhibit area utilized by the tigers. However, the difference in glucocorticoid concentrations between conditions was not significant. Further experimentation is required to demonstrate whether this type of scent enrichment has similar effects over longer periods of time and whether it is effective when applied to tiger enclosures at other facilities. Similar scent enrichments might also be valuable tools for increasing behavioral diversity in other species.*

Bonobo Bond: Maternal Care and Infant Developmental Behavior

Jennifer J. Elston, Ph.D. and Christine Pontiff
Fort Worth Zoo

*In spring 2013 a 19-year-old bonobo (*Pan paniscus*) housed at the Fort Worth Zoo in Fort Worth, Texas, gave birth to her first offspring. Another female in the troop had given birth to her third offspring in 2010. Keeper staff anecdotally observed that the inexperienced mother appeared very protective of her infant compared to the experienced mother, who provided ample care but was less restrictive with her infant during its first year. Data were collected to create a behavioral record for the first-time mother-son pair. Observations began when the infant was 3 months old and continued to 1 year of age. The mother continuously held the infant against her chest until he was approximately 4 months old. After that time, the infant gradually spent more time separated from her, although he remained in physical contact with her and within her arm's reach (sitting in front or to the side of her). At around 5 months he began moving around on his own and became increasingly more active, yet he continued to remain close to his mother until around 10 months of age. Throughout this period his mother continued to lift him to her chest and restrain him by holding his leg or arm as he tried to move further away from her, but by 7 months she began to release him from her grip more often as he became more exploratory. These data will contribute to the knowledge base regarding parent-rearing and infant development in zoo-housed bonobos.*

Stress Triangle - The Four Questions for Which Animals Need an Answer

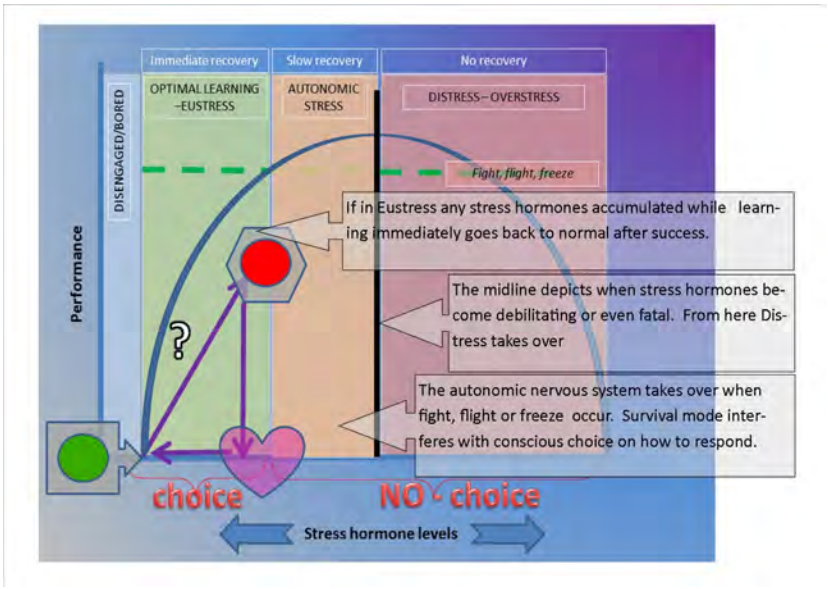
František Šusta – Prague Zoo;
Gabrielle Harris – South African Association for Marine Biological Research;
Tim Sullivan – Chicago Zoological Society, Brookfield Zoo

In 1908 scientists elaborated the Yerkes-Dodson curve which detailed learning performance from a state of 'boredom' to engagement and finally to impaired performance as a result of too much stress. In 2007 research into stress hormones in learning scenarios mirrored the shape of the curve. Operant conditioning when used appropriately can ensure animals are being trained to perform in the optimal or Eustress phase. Stress hormones generated in this phase are immediately released when the animal succeeds. If we go beyond the optimal level into the distress phase, the animal's learning is no longer a choice and more a reaction such as fight, flight or freeze. Here stress hormones are not immediately offloaded. Distress can result in disease and even death. Because stress is an internal state, we need to find a way to prevent the animal from moving into distress. This presentation provides a tool that trainers can use to ensure animals stay in the optimal learning phase. The model requires that the animal has the knowledge, choice and control to answer four questions "How can I stop the stimulus? Where can I relax? How do I initiate the training? Why do I train?"

Our poster outlines and illustrate the theory with examples. Furthermore the poster is looking at the hormone oxytocin - the caring hormone – and theorizes on the potential benefits that good relationships with animals can have on our training.

Methods:

Stress is an internal state so evidence is not always apparent. The stress triangle is based on the research and learning graphs that were developed in 1908 by Yerkes-Dodson and in 2008 by Lupien et al. In these learning graphs, performance is plotted from a state of boredom, to engagement (Eustress) and finally to impaired performance (Distress) as a result of too much stress. When animals have control over their environment, they are in a choice-based state and



thus can prevent stress. They remain in the Eustress phase.

To let animals remain in this phase during training, we have to ensure for them answers for four simple questions:

"WHY do I participate in the training?" The animal needs to know that there is a reinforcer available. The animal's motivation to participate must already be in place. This could be due to our presence (secondary reinforcer) indicating the possibility of food etc. So when you ask the animal "why are you training?" they would have an answer.

"How can I START the training?" The animal must be able to show that they are ready to participate. In this phase they are showing us that their stress hormones are at the low level and their body and mind are relaxed enough to make behavioral choices and decisions. Providing an animal with a cue when they are not focused on us is a typical mistake made by trainers where the animal is not showing us they are ready.

"How can I STOP the stressing process that is increasing the stress hormones?" The animal must always be in control of 'stopping' the aversive stimulus. For example, if we introduce a new object too quickly and the animal takes flight, it has not made a conscious choice to stay calm. It has taken flight as it is not able to 'stop' the stimulus. If our approximations are slow and clear enough, then we are able to stop advancing the stimulus at the point where the animal shows signs of being at its stress threshold that would lead to an escape response. By recognizing this threshold and staying below it we give the animal control of stopping the stimulus and thereby prevent the need to escape from it (in this case, the new foreign object).

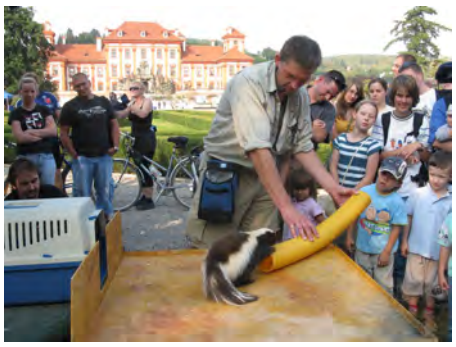
"Where can I relax? Where is my SAFE PLACE away from the stressor?" There must be a 'safe place' already trained. For many marine mammal trainers, the animal's focus in front of us (AKA-"station") could be this safe place. For some others the safe place is in their transport box, the exit to the backstage area, and, for a dog in the field training, the safe place should be the trainer.

Results:

We have used this method successfully in number of training situations including public show training or desensitization process. Here we can show two typical examples:

Example 1 - Skunk training for a children's program at the Prague Zoo.

Imagine a skunk that is trained to show his natural behavior on a table in front of 200 hundred screaming children. This situation could bring the animal's stress near the Fight, Flight, Freeze (FFF) line. If the skunk did not have an answer for STOP and SAFE PLACE, his own version of stop would be really smelly! We connect the table with his transport box which is his private place and is always left open. The answer for WHY is the opportunity for food. The answer for START is looking out from the box. When the skunk shows us his willingness to START, we call him to a target and he follows. But if the noise around becomes too loud or if the skunk becomes "confused" during training, he can turn back to the box (which is the answer for STOP) and where he finds his "SAFE PLACE" for relaxing.



Example 2 - Blood draw training on a sea lion male in protective contact at the Prague zoo.

During the desensitization process the sea lion stays in his private corner over the grate near the backstage salt pool. His reason "WHY" to engage in the training is the fish he expects. His "START" is when he offers his hind flipper to the trainers who are behind the grate. The trainer starts to desensitize and increases the pressure on the flipper (increase the potential stressor). If the arousal is too high and this pushes the internal stress of the sea lion close to the FFF threshold, the sea lion can "STOP" the training process just by pulling his flipper back. At this moment the trainer stops the activity and does not ask him for anything. His private area behind the grate is his "SAFE PLACE" where he can relax. Then, when he is relaxed, he gives his hind flipper back to the trainers without any cue. So, he communicates that it's time to "START" and we can go on with the desensitization process.



Summary:

Many of us have chosen our methods of training to ensure that we practise ethical animal care. This involves providing the animal with choice. Using these methods, it is possible that we don't always do this. If an animal is in a session and has no choice but to do the behaviour, and no reinforced alternative to choose, it will become stressed. Using our triangle, we can work to avoid this. The triangle will also assist us to diagnose problem behaviour. When we practise clear training we also build a positive relationship with the animals in our care. The caring hormones are then potentially present and these provide further opportunity for productivity in our training.

REFERENCES:

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Zero to 60: Aquarium of the Bay's Three-Month Strategy to Transition Wild North American River Otters, *Lontra canadensis,* to a Free-Contact Training Program

Ann L. Brethour, Melissa L. Schouest, Christina J. Slager
Aquarium of the Bay

On April 19, 2013, Aquarium of the Bay (AOTB) acquired 1.2.0 wild North American River Otters. These individuals were trapped for the fur trade in Louisiana approximately 4 months before their acquisition by AOTB. The otters were placed in quarantine behind-the-scenes where four trainers began working with the animals. The training staff was given 10 weeks to have these animals ready to go into their new exhibit on June 20, 2013. In that timeframe, these animals had to clear quarantine, undergo a complete physical with anesthesia, and be introduced to each other. An additional interesting obstacle was that the new exhibit did not have direct access to holding, this meant that the otters had to be trained to walk across an eight-foot-long chute enclosed with welded-wire mesh to move on and off exhibit. Trainers were successful at establishing free contact with all three otters on July 21, 2013 – one month after the exhibit opened to the public. All three otters are now hand-fed and trained on exhibit.

How We Began

On April 20, 2013, the day after the otters arrived at our facility, their training regimen began. The initial goals were to establish the bridge "good," teach the otters their names, and hand feed through the den gate. By the end of the first day, the oldest female (5 years old) was eating food out of a trainer's hand and bridge training had begun (Figure 1). On the second day, the younger female (3 years old) was also eating food out of a trainer's hand, albeit while vocalizing. The male (1 year old) took 4 days to begin taking food out of a trainer's hand, while in a kennel, and took 10 days to eat food out of a trainer's hand at the den gate. As soon as a bridge was established, target training began with each of the otters and an individual training plan for each otter was established.



Figure 1

Target training was also conducted through the den gate (1 inch wire-mesh). Individuals were gradually introduced to the target, and when passive targeting occurred, they were bridged and rewarded. The oldest female was again the first to pick up the behavior, consistently targeting after only 2 days.

In addition to target training, the females were shift training, and the male was crate training (to facilitate cleaning). The females took about 20 days to shift between dens consistently without being lured with food. The male was moving into the kennel consistently, although the behavior was not under control, within a few days. It was, however, very difficult to train the male to leave the kennel and return back into the den.

Otter Physicals

On May 10, 2013, all otters received a physical examination under anesthesia. Since this occurred only 20 days after training began, there was not enough time to injection train the otters. This resulted in the use of a squeeze cage for the injection. All physicals went smoothly and no major health issues were noted. At this time, the genders of the otters was confirmed, and the females were placed on Magestrol Acetate, a daily birth control.

Introductions and Free Contact Simulation

On May 29, 2013, introductions between the females began. The quarantine period was slightly longer than the average 30 days because more time was needed to eliminate parasites (various Strongylid nematode species) from the population. Introductions went smoothly. No aggression was noted between the females, in spite of literature stating that non-related female otters are often highly aggressive towards one another (Reed-Smith 2008). On June 5, 2013, introductions with the male began, alternating days with each female until June 11, 2013, when all three were allowed in together. Again, no aggression was ever noted.

Simultaneously during the introduction process, intensive training occurred with the otter that was not involved in that day of introductions. On June 10, 2013, the first "open door feed" occurred with our male, and in the following week, the females also began to open door feed (Figure 2). During those sessions, the front door to the den was cracked open, just enough for a trainer to fit their hand in, to begin to simulate free contact. All of the otters were initially hesitant to take food in this fashion, and the oldest female proved to be very grabby (i.e. lunging with teeth) when taking food, but none of the animals were aggressive towards their trainer.

As open door feeding progressed, trainers also began to go into the den with an otter (Figure 3). The dens are configured so that it is possible to have a trainer in one den and the otter in an adjacent den with guillotine access to the trainer. This also allows the otter to retreat to a safe space when afraid. The first attempts to get the otters to come to a trainer with no barrier present were successful only in that the otters could begin to grow accustomed to a trainer in their space.



Figure 2



Figure 3

Going Onto Exhibit

On June 20, 2013, the otters entered their exhibit for the first time. Our exhibit does not connect to the otter's holding space behind-the-scenes, so an 8 foot wire-mesh-chute is required for the otters to move on and off exhibit. Initially, the otters were herded off of the exhibit and behind-the-scenes, through the chute. Trainers would enter the exhibit with herding boards and the otters would leave through the chute back to their holding dens. On June 23, 2013, all otters moved off exhibit of their own accord, but shortly thereafter, the oldest female began to refuse to

shift on and off exhibit. The trainers hypothesized this was because she was not comfortable moving through the chute—because she would always move through as fast as possible and only when forced.

The entire first week the otters had access to the exhibit consisted of VIP events every evening, so the otters were only on exhibit during those times. The otter exhibit officially opened to the public on June 28, 2013, only 10 weeks after the otters arrived at AOTB. Since that time, the otters have spent their days on exhibit and returned to their holding dens at night. During the first two weeks, the otters were not fed on exhibit, only in the morning and evening behind-the-scenes to encourage them to return to holding at night. During their third week on exhibit, food was scattered around the exhibit periodically throughout the day so that the otters were not fed as heavily at one time.

Beginning Free-Contact Work on Exhibit

On July 21, 2013, the first true free contact session was attempted on exhibit, only 3 months after the otters arrived. After a few days, the otters all began to consistently eat food out of a trainer's hand during free contact sessions on exhibit. At this point, there were three animal care staff training the otters, and each was assigned to a specific otter.

Free Contact Work Now

To date, no serious aggressive events have ever occurred while training free contact. The oldest female is still occasionally grabby with food, but has calmed down overall (Figure 4). The only issues that have occurred have been with the oldest female. She has bitten boots aggressively on occasion, resulting in a session ending and her remaining food is thrown away. This most often occurred when she felt cornered, so she is no longer trained in specific sections of the exhibit. Occasionally, she seems to boot-bite when feeling frustrated by the trainer; such as, when a reward does not come fast enough. The other two individuals have never been aggressive towards their trainers, and will both take food very gently from a hand.



There have been a few instances of biting a target or target pole, but these have been occasional and isolated occurrences. When it is a gentle bite, or an open mouth on the target, the animal is redirected and strongly reinforced for a closed mouth target. If it is an aggressive bite, the animal's session is ended and food from that session is not given. During the next session, the animal will not be reinforced until the behavior has been performed successfully, at which point the animal is strongly reinforced.

Conclusions

Aquarium of the Bay has been very successful working free contact with our wild-caught North American River Otters. Having specific staff dedicated to individual animals facilitates relationship building and consistency of training. Although we have only transitioned three otters to free contact training at this time, we believe our results could be replicable with other wild-caught individuals due to the age range and sex representation.

Time permitting, we strongly recommend that more institutions attempt free contact training with NAROs. Our free contact experiences have proven successful and enriching, and we hope they will help mitigate the current otter free contact stigma. We plan to continue free contact

work with our otters for as long as it remains a positive experience for both otters and trainers (Figure 5).



Reference

Reed-Smith, J. (2008). Housing and enclosure requirements. *North American River Otter Husbandry Notebook, 3rd Edition* (ed.): John Ball Zoo. (104)

Using a Laser Pointer and Scale Training as a Tool for Aggression Reduction and Weight Management of Cranes

Bobby Anderson and Derek Zagort
Fort Worth Zoo

The Fort Worth Zoo in Fort Worth, Texas, houses wattled (Bugeranus carunculatus) and sarus (Grus antigone) cranes. Our goal was to scale train the cranes to provide a weighing method that was both safe for the birds and the keepers, while also reducing the cranes' aggression. The first objective was to train the birds to target to a laser light. After several months both cranes had mastered targeting. The second objective was to introduce a mat to simulate a scale platform. Upon introduction, there were some adverse reactions by the birds that were addressed and then corrected by modifying the training protocol. Once both birds had acclimated to the mat, it was then elevated to the scale's height. Within a few weeks, both birds were successfully targeting onto the elevated mat. The scale was introduced and both birds were successfully targeted onto the scale and weights were obtained. This training technique has provided an opportunity for these birds to be weighed for the first time without having to be caught and handled. There are many other beneficial applications to the target training as well, and other positive interactions have been noted. The birds will voluntarily shift on and off exhibit, consume medicine-vectors, and will now approach keepers for close examination.

Introduction and Methods



A laser pointer was used successfully to target train an East African crowned crane (*Balearica regulorum*; Girsch, 2012), and we wanted to determine whether this tool would also be effective for training the 1.0 wattled (*Bugeranus carunculatus*) and 0.1 sarus (*Grus antigone*) cranes housed at the Fort Worth Zoo in Fort Worth, Texas. The first objective was to introduce a laser pointer to the wattled and sarus cranes. Four different laser light colors were used at the start of training to see which would work best. The colors were blue, green, purple, and red. It was quickly discovered that the green light was the most effective. Once the birds acknowledged the light they received a reward of popcorn. Over time popcorn became an ineffective reward and superworms became the reward of choice for both cranes.

After the birds were acknowledging the light, the goal was to get them to peck the light. When the birds had mastered pecking the light, we began moving the light for them to follow. A black mat (24 x 24 in.) was then introduced into the enclosure to simulate where the scale was eventually going to be placed. Both birds were hesitant to go near the mat at first. Eventually, they became comfortable enough to not only come near the mat but to step onto the mat and remain there while targeting the laser light.



Once the birds were comfortable with the mat the next step was to elevate the mat to simulate the height of the scale. The mat was placed on concrete blocks and the birds were cued to target on the elevated mat. Both birds responded to the elevation without any major setbacks. The mat that had been used throughout training was then attached to a Plexiglass platform and the birds were cued to target onto

the mat which was now elevated on the platform. The mat and platform were then placed on top of the scale and introduced to the exhibit.

Results

The birds were quick to target onto the scale. On 1 September 2013, the first day of putting the scale in with the sarus crane, we were able to obtain a weight. She weighed 6.34 kg. On 1 October 2013, the first day the scale was introduced to the wattled crane, a weight was obtained. He weighed 9.82 kg. After this training project began, a significant reduction in aggression has been noted in the male wattled crane, including a reduction in charging at the fence when a keeper is nearby. Also, shifting from exhibit to holding has become a safer and easier experience for both the animals and keepers.





Discussion

The sarus crane was in breeding season for most of the month of July and she did not want to train. After breeding season, she immediately began participating in training again, indicating it was a positive experience for her. The wattled crane showed a lack of interest in training on multiple occasions and was distracted several times by the female wattled crane approaching him during training sessions. Many different items were offered as food reinforcement to keep his attention during the sessions until superworms became the obvious choice.

This training technique has provided an opportunity for these birds to be weighed for the first time without having to be caught and handled. There are many other beneficial applications to the target training as well, and other positive interactions have been noted. The birds will voluntarily shift on and off exhibit, consume medicine-vectors, and will now approach keepers for close examination. Not only did we accomplish our goals of obtaining weights and reducing aggression through this project, but the daily training also provided mental stimulation and served as a form of enrichment for the cranes.

References

Girsch, D. (2012). Behavioral management of a 1.0 East African crowned crane (*Balearica regulorum*) through laser pointer training. *Animal Keepers' Forum* 39(12), 568-572.

Training Gorillas for Cardiac Ultrasound

Kate Thomas, Angie Vtipil, Erin Heavey and Jennifer Elston, Ph.D.
Fort Worth Zoo

The Fort Worth Zoo in Fort Worth, Texas, houses five (2.3) western lowland gorillas (Gorilla gorilla) ranging from ages 23 to 43. Because heart disease is the primary cause of death of gorillas in zoos, having the capacity to monitor their hearts on a regular basis would be beneficial to their long-term health care. This presentation will outline our plan for training our gorillas and how we handled the challenges we faced when training our oldest gorilla, Ramses. The first step was to train the gorillas to present their chests against the mesh. Once this was accomplished, we familiarized the gorillas to having additional staff at their training sessions to prepare them for the presence of a professional cardiac ultrasound technician in the future. We then used a mock ultrasound wand (made from PVC) to desensitize them to being touched on their chests with the wand and subsequent transducer gel. We increased their hold time by offering continuous positive reinforcement. After we mastered the beginning steps, we partnered with a technician whose expertise and high-quality equipment has enabled us perform diagnostic exams on our gorillas. We discovered that each gorilla must position themselves differently for us to obtain quality images of their hearts. We are now able to perform cardiac ultrasounds on all five gorillas. Images acquired will be submitted to the Great Ape Heart Project database and can be studied to learn more about risk factors for cardiac disease in order to enhance the health of apes in zoos.

Introduction

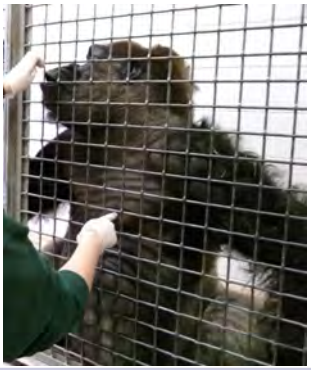
Heart disease is a primary cause of death of gorillas (*Gorilla gorilla*) in zoos. The Great Ape Heart Project (GAHP), led by Zoo Atlanta, was established to better understand cardiovascular health and disease in great apes by creating and maintaining a comprehensive database of cardiac information from apes housed in Association of Zoos and Aquariums (AZA) zoos. The Fort Worth Zoo in Fort Worth, Texas, houses five (2.3) western lowland gorillas ranging from ages 23 to 43. Fort Worth Zoo World of Primates staff developed a training plan to train the gorillas to present their chests for heart condition monitoring via cardiac ultrasounds. Having the capacity to monitor the gorillas' hearts on a regular basis will be beneficial to their long-term health care and well-being and will also provide information for the collaborative GAHP.

Training Steps

First, we trained the gorillas to present their chests against the mesh. Each gorilla positioned its body in its own unique way that appeared most comfortable for them and which enabled us the best view of their hearts. Our oldest male gorilla held his chest against the mesh with







his arm down while he was sitting. Our oldest female gorilla held her chest against the mesh with her arm up while sitting. Our younger gorillas held their chests against the mesh with their arms up while standing.



Next, we introduced a mock ultrasound wand. Then, we added gel to the mock ultrasound wand to desensitize the gorillas to the feel of gel on the wand. After the gorillas were acclimated to the gel, a non-keeper staff member joined the training sessions to prepare the gorillas for the future presence of a cardiac ultrasound technician. Once we were confident the gorillas were holding their positions we used the zoo's ultrasound machine to locate each gorilla's heart and fine-tune their positioning. Finally, after successfully locating each gorilla's heart a cardiac ultrasound technician joined Fort Worth Zoo staff to perform cardiac ultrasounds on the zoo's gorillas for diagnostic exams.

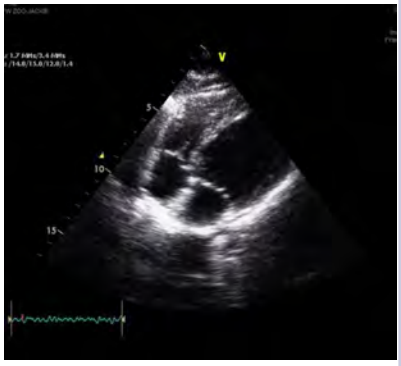
Challenges and Solutions

During our training we encountered some challenges. One challenge was desensitizing our 43-year-old male gorilla, Ramses, to the presence of a non-keeper staff member during training sessions. At first he would display and refuse to train. To resolve this, the non-keeper staff member started wearing a keeper uniform shirt to blend with staff and attended sessions daily. Over time Ramses decreased his displaying and increased his time spent training. Another challenge was the gel on the mock ultrasound wand. Most of the gorillas were afraid of it and one of the females wanted to eat it when it was on her. Our solution was to offer them more enticing reinforcement as we continued to use the gel. With time they all began to accept it. Some of our gorillas, such as our 24-year-old male, would not hold for long periods. To encourage him to hold his chest in position longer we switched his reinforcement from food items, such as grapes, to juice (using a squirt bottle to offer). This kept his attention and in return he was willing to present his chest for longer periods.



Obtaining Our Goal

In August 2011 we used the zoo's ultrasound machine on our male gorilla Ramses for the first time and were able to find his heart immediately. After that, we used the machine to find the hearts of all our gorillas. A cardiac ultrasound technician joined the sessions to obtain diagnostic images. While the keeper continued to hold the ultrasound wand, the technician could view the images on the machine and guide us to the best positions to obtain the desired images.



Through this training we have seen the apical four chamber, long axis and short axis views on all five gorillas and have been able to capture images for diagnostic exams. Time, patience, and support from our team were instrumental to our success, and this training will benefit the health of not only the Fort Worth Zoo's gorillas, but gorillas in other zoos as well.

Acknowledgements

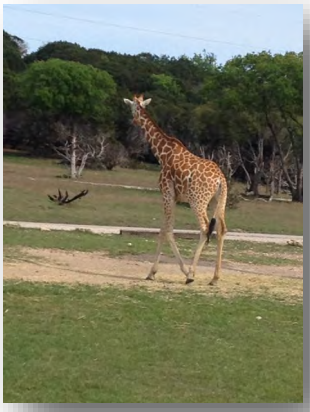
We thank the Fort Worth Zoo World of Primates (WOP) supervisor Linda Roberts, WOP keeper staff for excellent care of the gorillas and management staff for training support. We also thank our Director of Veterinary Services Dr. Nancy Lung and veterinary staff for their cooperation and assistance. Additional thanks are extended to cardiac ultrasound technicians Anna King and Pam Money for volunteering their time and expertise to this effort.

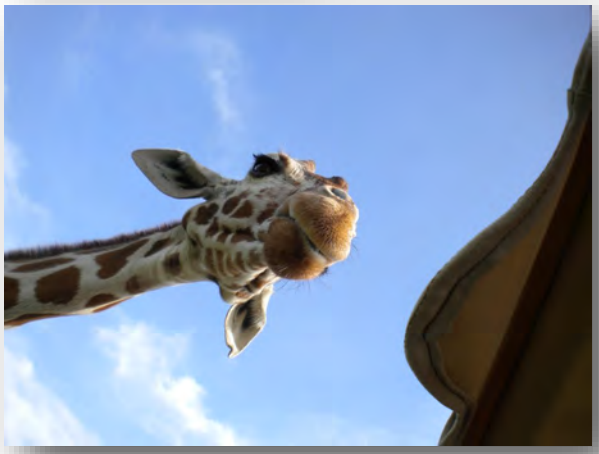
Events

Pre Conference Trip—Fossil Rim Wildlife Center



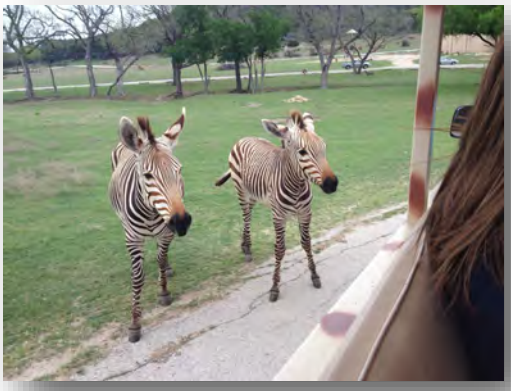
FOSSIL RIM
WILDLIFE CENTER



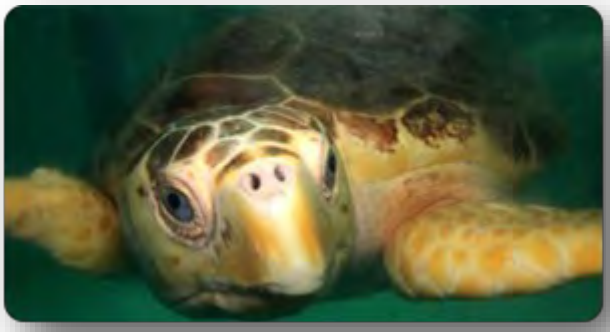








Icebreaker









Career Night

When working with animals we know it is important to read their body language, but how much do we understand about our own?!!? Many people say less than 10% of human communication is based in words, so what can you do to appear calm, confident & ready for a challenge when interviewing for a job? This was discussed and then put to use during mock interviews with professionals in our amazing industry. Those who came to Career Night learned, networked & had some fun where they were welcomed with open arms!





Zoo Day—Dallas Zoo

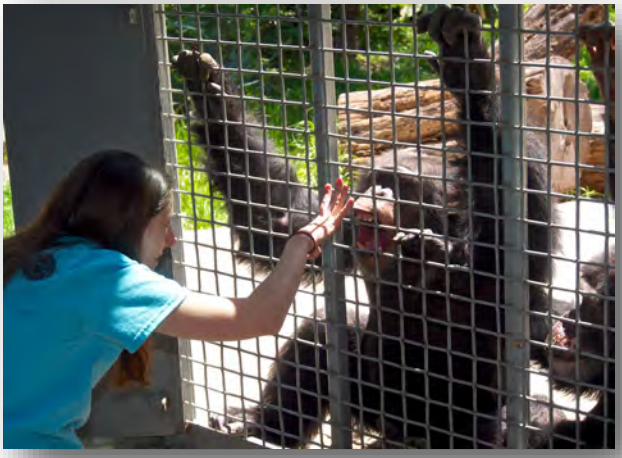






DALLAS ZOO







Poster Night at the Dallas Zoo







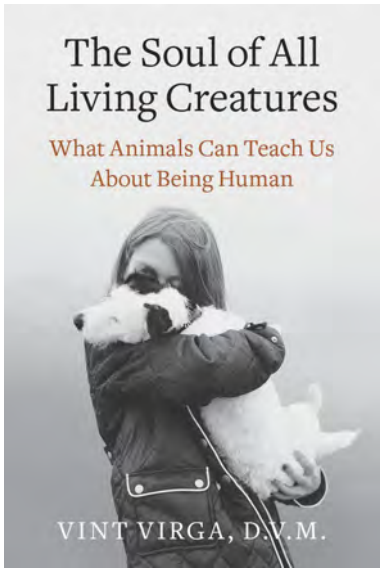






Book Reading and Signing

The Soul of All Living Creatures
What Animals Can Teach Us about Being Human
Vint Virga, DVM



Based on the author's twenty-five years of experience as a veterinarian and veterinary behaviorist, *The Soul of All Living Creatures* delves into the inner lives of animals – from whales, wolves, and leopards to mice, dogs, and cats – and explores the relationships we forge with them.

As an emergency room clinician four years out of veterinary school, Dr. Vint Virga had a life-changing experience: he witnessed the power of simple human contact and compassion to affect the recovery of a dog struggling to survive after being hit by a car. Observing firsthand the remarkably strong connection between humans and animals inspired him to explore the world from the viewpoint of animals and taught him to respect the kinship that connects us.

With *The Soul of All Living Creatures*, Virga draws from his decades in veterinary practice to reveal how, by striving to perceive the world as animals do, we can enrich our own appreciation of life, enhance our character, nurture our relationships, improve our communication with others, reorder our values, and deepen our grasp of spirituality. Virga discerningly illuminates basic traits shared by both humans and animals and makes animal behavior meaningful, relevant, and easy to understand. Insightful and eloquent, *The Soul of All Living Creatures* offers an intimate journey into the lives of our fellow creatures and a thought-provoking promise of what we can learn from spending time with them.

For over twenty-five years, Dr. Virga has been a distinguished practitioner and leader in veterinary medicine, recognized for his insights into our relationships with animals. His expertise spans the animal kingdom from dogs and cats to wild species such as leopards, gibbons,

wolves, and giraffes. As the founder and CEO of Veterinary Healing Arts, he has worked extensively with dogs, cats, and their human families on behavioral issues of concern to them and currently serves as a consultant to zoos and wild animal parks on the behavioral well-being and management of animals in their care.

A recognized expert on animal behavior and a prominent advocate for nurturing the human-animal bond, Dr. Virga has appeared as a featured guest on ABC World News, PBS Nature, and National Geographic Explorer. Outside of clinical practice, he has served as an advisor to leading U.S. corporations, professional associations, and animal welfare organizations; a veterinary liaison to the U.S. congress; and an expert on legal and legislative issues concerning animal health and welfare. He is distinguished for his insights into the parallels between human and animal behavior – making animal behavior meaningful, relevant, and easy to understand.

In his writing, Dr. Virga portrays a unique sensitivity and compassion toward both humans and animals. His first book, *The Soul of All Living Creatures*, was published by Random House / Crown in July 2013 and will be released in paperback this coming July. He writes a regular blog for *Psychology Today* and has contributed to *Conjunctions*, *Biographile*, *MindBodyGreen*, *Books for Better Living*, and TheDodo.com. In recognition of his writing, Dr. Virga has been awarded two MacDowell Fellowships and a George and Kate Kendall Fellowship.

Dr. Virga received his Doctorate in Veterinary Medicine from the University of California, Davis and completed his clinical residency in behavioral medicine at Cornell University. He is board-certified in veterinary behavior and a Diplomate of the American College of Veterinary Behaviorists.

Dr. Virga lives in southern New England with his wife, daughter, and two Norwegian forest cats.

Awards Banquet



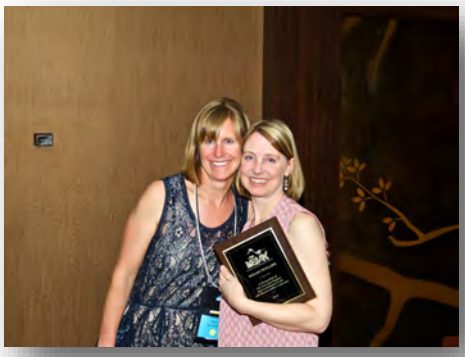












Post Conference Trip – Fort Worth Zoo

fort worth zoo





Awards

2014 ABMA Award Winners

Travel Scholarship Winner: This scholarship is awarded to an ABMA member whose institution is unable to give them financial support. The Travel Scholarship will help the award recipient by giving them the ability to present their work and it will help the organization by giving ABMA members the opportunity to hear presentations that the membership otherwise would not have the opportunity to hear and as such, the Travel Scholarship supports the ABMA Core Value of "Sharing the Knowledge".

A Tall List in Short Order: Developing a Positive Reinforcement Based Cheetah Training Program to Meet Programming and Collection Management Goals

Justin Garner and Antonio Ramirez

Sea World Parks & Entertainment - Busch Gardens Tampa



Behavioral Management Achievement Award: Recognizes an outstanding achievement in the application of behavior management techniques.

Never Too Old: Voluntary Injection Training with a Geriatric Amur Tiger

Vicki Hardstaff

Toronto Zoo



Behavioral Management Innovation Award: Recognizes outstanding application of novel, unusual or original behavior management technique.

Training Voluntary Reproductive Assessments and Artificial Insemination with African Elephants (Loxodonta Africana) *In a Protected Contact Environment*

Maura Middleton and Michael Burns

Tampa's Lowry Park Zoo



Behavior Management Welfare Award: Recognizes achievements that enhance animal welfare through specific environmental enrichment/conditioning techniques or programs.

Fancy Footwork: Cheyenne Mountain Zoo's Giraffe Herd Trains for Voluntary Farrier Work and Xrays

Amy Schilz

Cheyenne Mountain Zoo



Poster Presentation Award: Recognizes the best poster that represents an achievement in any of the above categories in this format.

"Stress Triangle" - The Four Questions for Which Animal Needs to Have an Answer

František Šusta, Prague Zoo

Gabrielle Harris, South African Association for Marine Biological Research

Tim Sullivan, Chicago Zoological Society, Brookfield Zoo



Impact Award: This award is chosen by all delegates at the end of the last formal presentation. Delegates may cast a vote for any paper, poster, or activity that they feel deserves special recognition.

Training Voluntary Reproductive Assessments and Artificial Insemination with African Elephants (Loxodonta Africana) In a Protected Contact Environment

Maura Middleton and Michael Burns

Tampa's Lowry Park Zoo



Member's Business Meeting

Animal Behavior Management Alliance

Annual Member Business Meeting Agenda
April 15, 2014
Dallas, TX

I. Call to order at 12:20 pm CST by Heather Leeson.

II. Minutes recorded by Christine McKnight.

III. Opening comments (Heather Leeson)

IV. Acceptance of the minutes from the 2013 member business meeting.
MOTION made by Heather Leeson to accept the 2013 member business meeting minutes, having been reviewed in advance. Second made by Genevieve Warner_. **Motion passed by unanimous consent.**

V. Board reports
- A. President report (Heather Leeson)
- B. CFO report (Susie Ekard, on behalf of Nicki Boyd)
  - i. 2013 Financial report
- C. Past President (H. Leeson on behalf of Emily Insalaco)
  - i. Election results
    1. Review of election process
    2. Incoming board members as a result of the 2013-2014 election
- D. President Elect (Margaret Rousser)
  - i. Program Council Chair introductions
    1. Behavior Management Fund- Michelle Farmerie, Genevieve Warner
    2. Conference- Kirstin Anderson Hanson
    3. Conference Content Advisory- Megan Phillips,
    4. Conference Proceedings- Jennifer Hickman, Sam Smith
    5. Education- Missy Lamar
    6. Government Affairs- Otto Fad
    7. Honors and Awards- Jennifer Hennessey, Scott Trauger
    8. Membership- Amy Schilz
    9. Merchandise- Susie Ekard
    10. Nominations and Elections- Heather Leeson
    11. Public Affairs- Margaret Rousser
    12. Publication- Heidi Hellmuth
    13. Research and Evaluation- Darren Minier
    14. Site Selection- Kelly Elkins
    15. Sponsorship- Cathy Schlott
    16. Website- Heather Leeson
- E. 1st VP (Jennifer Hickman)

i. Thank you to all our sponsors:
ii. Thank you to our conference hosts:
iii. Conservation project support

F. 2nd VP (Annette Pederson)
i Announce 2015 conference in Denmark April 13-18 Tue-Sat

G. Announce 2016 conference in Tampa (Heather Leeson, Margaret Rousser)

H. Secretary (Christine Mcknight)
i. Membership update - Current membership of 9 Lifetime Professional, 206 Professional, 27 Active, 79 Associate and 24 Student totaling to 345. Representing 16 countries including: Australia, Austria, Canada, China, Czech Republic, Denmark, Finland, France, Hong Kong, Ireland, Israel, Netherlands, Spain, United Arab Emirates, United Kingdom, United States .

I. BMF Travel Scholarship (Cinnamon Williams)
i. travel scholarship winner Jay Tacey presenting . Please buy raffle tickets. Please purchase downloads so it isn't a quite banquet! Portion of the silent auction

J. Proceedings Committee (Jennifer Hickman)
i. If presenting email your papers so we can get the proceedings out as soon as possible

K. Publications Committee (Heidi Hellmuth)
i. Send submissions

L. Conference Content Advisory Committee (Megan Phillips)
i. CEU's IAABC, IATCB (IAATE)
ii, Abstracts reviews
iii. Looking for a co-chair

M. Site Selection (Kelly Elkins)
i. Call for host cities 2017, 2018

VI Old Business
A. CollaborNation (Heather Leeson, Susie Ekard)
B. Animalprofessional.com

VII. New Business
A. Acknowledgement of outgoing board members (Heather Leeson) - All board members serve on a volunteer basis and we thank them for their time.
i, Nicki Boyd
ii. Emily Insalaco
iii. Christine McKnight
iv. Darren Minier
v. Cathy Schlott
vi. Margaret Whittaker

B. Acknowledgement of 2014-2015 board members (Heather Leeson)

President- Margaret Rousser	CIO- Christa Gaus
President Elect- Nicki Boyd	Director- Missy Lamar
Past President- Heather Leeson	Director- Jay Tacey
Secretary- Cinnamon Williams	Director- Jennifer Hickman
CFO- Susie Ekard	Director-
1st Vice President- Annette Pederson	Director-
2nd Vice President- Scott Trauger	Director-

C. Bylaws (Heather Leeson)
D. Trademark (Heather Leeson)
E. Website (Heather Leeson)
F. AAZK Updates (Heather Leeson)
G. Outgoing president comments (Heather Leeson)

VIII. Motion to adjourn

MOTION made to adjourn 2014 member business meeting at 12:50_pm CST by Heather Leeson. Second by _Kirstin_____. **Motion passed by unanimous consent.**

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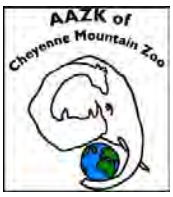


























Acknowledgements

We would like to thank the Proceedings Committee members for all of their hard work on putting this together! With the multitude of papers that are submitted each year, it takes all of us to go through and proof read and edit them. We value the time and energy that they put into making sure these papers are ready for the proceedings!

Also thank you to Gary Wilson who shares his wonderful pictures with us. It adds to character to the proceedings.

Jen Hickman and Sam Zurlinden

2014 Proceedings Committee members:
Ann Lablans
Christina Lavallee
Cindy Wilson
Jane Anne Franklin
Peggy Hoppe
Stacie Marchionne
Dr. Susan Friedman