The Animal Behavior Management Alliance

2016 Annual Conference

www.theabma.org

Disclaimer

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

Dr. Susie Ellis

Executive Director

International Rhino Foundation

Dr. Susie Ellis has been the Executive Director of the International Rhino Foundation since 2006, overseeing the organization's administration, fund raising, and field conservation programs in Africa and Asia. She is a member of the IUCN African Rhino and Asian Rhino Specialist Group and serves as the Red List Authority for the latter. Prior to joining IRF, she was a Vice President at Conservation International, focusing on terrestrial and marine biodiversity conservation in Asia. She has written more than 100 technical papers, proceedings and book chapters. From 1991-2001, she was Senior Program Officer for IUCN's Conservation Breeding Specialist Group (CBSG). Dr. Ellis also has worked at the Minnesota Zoo, Lincoln Park Zoo, San Diego Zoo and Sea World in various capacities. Dr. Ellis is a seasoned wildlife conservationist, having worked in more than 35 countries during the course of her career, with species ranging from penguins to pandas, and now, rhinos. Dr. Ellis works out of the Strasburg, VA program office.

Research and Evaluation Workshop

Methods to Aid in Behavioral Choices for the Individual Animal

Nicole Dorey, PhD

University of Florida

It is widely acknowledged that environmental enrichment plays an important role in promoting the welfare of captive animals. The most common approach to evaluating environmental enrichment (EE) strategies for captive animals is direct observation of behavioral measures over time. Although this method can be valuable it can also be time consuming and may not always be practical; as a result zoo personnel may rely only on non-systematic or subjective methods, without quantitative analysis to assess enrichment efficacy (Watters, et al. 2009). Therefore, caretakers may benefit from an alternative method of enrichment evaluation that is both efficient and reliable, when observational evaluations are not possible. Preference assessments, an alternative method for evaluating enrichment, allow the animals to choose directly which enrichment strategy they prefer. Not only will this method allow zoo personal to collect data on these preferences, but it could improve the welfare of the animal if an animal is found to strongly prefer an EE item (eg. Mason et al., 2007) and will help with the goal of most zoos to increasing the animal's behavioral choices and decisions within their own environment.

The purpose of this workshop would be to teach the attendees about the different types of preference assessment; where it has been used traditionally, the research we have done so far with non-human animals and how it can be further expanded in a captive animal setting. The second half of the workshop would be to demonstrate to the attendees how to implement one type of preference assessment (a paired-stimulus preference assessment), with data collection and analysis. EE for this demonstration will be determined by the zoo staff beforehand. To increase motivation and maintain equal levels of deprivation across the EE I will ask, if possible, that those items not be given a few days before the demonstration (other EE can be given). Also it is important for this demonstration, that we either the EE that is not associated with food or if food is used that each EE item have the same food and be of the same size.

Prior to implementing a paired-preference assessment, EE are given one at a time to the participating animal so that they have a chance to interact with each one. After they have been presented with each item, the EE are then presented in a paired arrangement. The order of the pairs are randomized and counterbalanced, such that every combination of pairs in every possible position is presented to the subject exactly once.

Individuals will have two minutes to make a choice (or some other length of time determined by the keepers) before the trial will be terminated and deemed as NC (i.e., no choice). Additional trials may be need to be run if two or more EE are chosen for the same number of trials overall. I have included a video of a trial so that you can see 1) what they look like 2) the time each trial could take.

I will explain how to analyze the data collected (quick quantitative assessment) and can provide graphs later that day if there is time and interest.

Nicole R. Dorey, Ph. D. is faculty at the University of Florida, where she teaches courses in psychology and animal behavior. In addition to her teaching, Nicole is co-founder and director of the animal behavior and

welfare laboratory which has published many scientific papers with species ranging from dogs to Galapagos tortoises. Her current research focuses on behavior choices to increase animal welfare and investigations to find the most effective positive reinforcement training method. In addition to being a Certified Applied Animal Behaviorist (CAAB), Nicole has served as a board member of the Animal Behavior Management Alliance (ABMA), consulted on animal research and training at a variety of zoos and has been an invited speaker to a number of national and international conferences and workshops. Nicole holds a B.S. degree in both zoology and psychology from the University of Florida, an M.S. degree in behavior analysis with a minor in biology from the University of North Texas and a Ph.D. in animal behavior from the University of Exeter (England).

Human PSPA Data Sheet
Paired-Choice Preference Assessment

Subject: _____ Date: _____ Evaluator: _____

Trial Stimuli

(Circle chosen option, if none are chosen mark as no choice)

1.	4 vs. 2	7.	1 vs. 3
2.	3 vs. 2	8.	3 vs. 1
3.	3 vs. 4	9.	2 vs. 3
4.	2 vs. 1	10.	1 vs. 4
5.	4 vs 1	11.	4 vs. 3
6.	2 vs. 4	12.	1 vs. 2

Results: Enter number of trials each stimulus was chosen and calculate the final percentage.

1= , 2 = , 3 = , 4 = , 5 = , 6 =

1. _____ : _____ / 10 * 100 = _____%

2. _____ : _____ / 10 * 100 = _____%

3. _____ : _____ / 10 * 100 = _____%

4. _____ : _____ / 10 * 100 = _____%

5. _____ : _____ / 10 * 100 = _____%

6. _____ : _____ / 10 * 100 = _____%

Adapted for ABMA workshop from:
Mehrkam & Dorey (2014). Does preference predict enrichment efficacy? *Zoo Biology 33*: 275-284 and

Mehrkam & Dorey (2015). Preference assessments in the zoo: Keeper and staff predictions of enrichment preferences across species. *Zoo Biology 34*: 418-430.

Multiple Stimuli without Replacement (MSWO) Data Sheet

Animal: _____ Date: _____

Observer: _____

List of Reinforcers:

A:_____ B:_____ C:_____ D:_____

E:_____ F:_____

Item Selected	First	Second	Third	Fourth	Fifth	Sixth

Tortoise Paired-Choice Preference Assessment

Subject: _____ Date: _____ Evaluator: _____

Circle the item selected. Mark as no choice if nothing was chosen within 5 min.

Trial	**Stimuli (Circle Chosen)**		
1.	BB vs NR	7.	NR vs SP
2.	NR vs SS	8.	SS vs BB
3.	NR vs SP	9.	SS vs NR **Wolf Paired-Choice Preference Assessment**

Subject: _____ Date: _____ Evaluator: _____

Circle the item selected (touched with any part of the body) within 10 s. Mark as no choice if nothing was chosen within 10 s and initiate the next trial.

Wolf Paired-Choice Preference Assessment

Subject: _____ Date: _____ Evaluator: _____

Circle the item selected (touched with any part of the body) within 10 s. Mark as no choice if nothing was chosen within 10 s and initiate the next trial.

Trial	**Stimuli (Circle Chosen)**		
1.	Paint vs BB	7.	BB vs Paint
2.	Station vs. Paint	8.	Station vs BB
3.	BB vs Station	9.	Tire vs Station
4.	Tire vs BB	10.	BB vs Tire
5.	Station vs Tire	11.	Paint vs Station
6.	Paint vs Tire	12.	Tire vs Paint

Results: Enter number of trials each stimulus was chosen and calculate the final percentage.

1. Paint : _____ / 6 * 100 = _____%

2. Stump : _____ / 6 * 100 = _____%

3. Boomer ball : _____ / 6* 100 = _____%

4. Tire : _____ / 6 * 100 = _____%

Workshops

There's Nothing Wrong with a Pig in Sh*t! Shifting Our Priorities in Favor of Psychological Well Being

Margaret Rousser
Oakland Zoo

Animal welfare is a hot topic worldwide, but we still do not have a practical definition that addresses the most common concerns. That shouldn't stop animal care givers from striving to enhance an animal's well-being. In the past 30 years, we have witnessed changes in the quality of care we provide our animals from improved nutrition and veterinary care to new substrates and disinfectants. These improvements in animal management and husbandry have enhanced the lives and health of our animals immensely which has led to increased longevity in nearly all species. But we still need to ask ourselves are we providing good *psychological* welfare for our animals? Even more recently, operant conditioning and environmental enrichment have become easily applicable tools for improving animal welfare, but time is a significant factor in administration of these tools. Too often, we favor basic husbandry over enrichment and training, but an animal's psychological welfare should be considered a top priority. Oakland Zoo in California is addressing the issue of prioritizing psychological welfare by creating clear expectations for keepers and managers so that time for training and enrichment is not just possible, but mandatory! The resulting psychological well-being matrix, individually developed for each species, allows keepers to constructively prioritize their time and find a balance between basic husbandry and psychological well-being. Not only has this matrix enhanced the quality of life for our animals, but it creates a practical infrastructure for keepers and managers to offer the quality of care their animals require on a daily basis.

Integration of Operant Conditioning and Veterinary Care in Managed Wildlife

Ray L. Ball, DVM
Tampa's Lowry Park Zoo

The primary focus of the modern zoo veterinary clinician is to ensure the heath and well-being of the collection. There are many components and disciplines involved in this charge. All the basics of domestic animal medicine and surgery have a significant role in this. Nutrition and the proper design and use of physical facilities are also important for obvious reasons. Psychological and sociological aspects of zoo animals are relatively new concepts into their overall health. Environmental enrichment has become its own discipline and is ever growing into the everyday care of these animals. A comprehensive preventative health care program involves not only those items we take for granted as veterinarians (physical exams, screening for infectious agents, etc.) but also looks at the mental health of the collection. While enrichment and operant conditioning can provide a means for good mental health it can also become a very powerful tool in the zoo veterinarians' arsenal to help them achieve their goal of ensuring the best possible care for the collection they are responsible for.

Operant conditioning (OC) is an extremely useful tool for the clinical staff, a method to help manage animals, an addition to the enrichment plan, and generally well received by the animal care staff. For OC to work for facilitating veterinary care several aspects must be synchronized. First, trained animal care staff must be able to work with the animal, or group, using positive methods to achieve the desired behavior. Second, physical facilities must allow, or be re-designed to allow, the physical manipulation or behavior to be carried out. The veterinary staff must then be willing to commit a substantial amount of time into the entire project before any results come. The same standards of training apply for the veterinary staff and discipline must be maintained. Consistency with what you do as a clinician around the animals is as important as it is when the staff works with them.

From a clinical standpoint, behavior is best thought of as a summation of the physical, sociological, environmental, and psychological health or an individual or group of animals. Behavior is actually one of the most sensitive indicators that one of these systems is being affected adversely and therefore a sensitive barometer to health. Being able to simply have animals comfortable around the veterinary staff is a huge step in advancing health and welfare of any collection or individual. Perhaps the first and most important step for a veterinarian is developing a rapport with the animals. This can be achieved by simply having them comfortable with you and in this context can become play. Consistent follow up is in order to maintain established criterion of behavior or just a level of comfort with individual animals. All take considerable time but can be very rewarding for yourself as a clinician, the staff, and especially for your patients. Investing in the animals and the care staff equally is essential and interpersonal relationship are especially critical. It is important for veterinarians to remember that every animal or group of animals has some person(s) responsible for its care. If you cannot manage that relationship there is no possibility to improve the care of the animals involved.

Ray Ball, DVM, is the current director of medical sciences for Tampa's Lowry Park Zoo. In addition to his work at Tampa's Lowry Park Zoo, Ball serves as a contract veterinarian at Homosassa Springs Wildlife Park. "The Zoo has a long proven history and dedication to providing vital care for sick and injured manatees, and the selection of Dr. Ball serves to further complement the Zoo's experienced manatee critical care staff,"

said Patrick Rose, executive director of the Save the Manatee Club. Ball had nearly a decade of experience working with the Zoo's animal department as a relief veterinarian before becoming the Director of Medical Science for the zoo. Prior to his Director role, he served as a senior veterinarian at Busch Gardens Tampa Bay for 14 years. His leadership in conservation programs managed by the Association of Zoos and Aquariums (AZA) includes advisory roles with Species Survival Plans (SSP), Population Management Plans (PMP) and the Nutrition Scientific Advisory Group (NAG) for elephants. Ball graduated from the University of Florida's College of Veterinary Medicine and spent a year in private practice. He gained zoological experience through an internship at Riverbanks Zoo in South Carolina and a residency specializing in zoo and wildlife medicine at Kansas State University and the Topeka Zoo. Ball's academic publications include numerous articles on topics ranging from wildlife anesthesia and epidemiology to operant conditioning as a tool for improved veterinary care.

Special Presentation

Dr. Ashley Barratclough

Dallas World Aquarium

Marine mammal medicine is a vastly growing field in veterinary medicine and is a particularly prominent topic in animal behaviour. The aim of this talk is to highlight some of the welfare issues faced by marine mammals in the wild. This is then linked with how training in human care can advance veterinary techniques to further assist their wild counterparts. Case studies including entanglement in right whales, fishing gear entrapment in seals and boat strikes in manatees will be discussed. Behavioural training to include body part presentation for blood draws, and morphometrics can directly assist in assessment of wild marine mammals. Morphometrics can be used to facilitate indirect weight measurements to facilitate accurate sedation and medication to enable successful disentanglement of whales and dolphins from fishing gear. This summary is aimed to try and highlight conservation issues in free ranging marine mammals and how the trainers and veterinary staff can work together to achieve optimum goals.

Dr. Ashley Barratclough is currently the veterinarian at the Dallas World Aquarium. She graduated from the Royal Veterinary College in London in 2009. She spend the next few months following graduations working for a IFAW in South Africa. She then undertook 3 years in mixed practice working with farm equine and small animals before pursuing a Masters in Wild Animal Health at the Zoological Societ of London. Following this she moved to the University of Florida to undertake a Masters in Manatee Health and Conservation whilst working as a clinical veterinarian in manateed rehabilitation at Tampa's Lowry Park Zoo.

Training 101
Terminology Panel

Training 101 is in a brand new format for the 2016 conference. Learn and SEE commonly misused and misunderstood training terms & applications from a panel of experts. This new Training 101 seminar will feature real life video, a variety of species, and a panel of experts to facilitate an open and constructive discussion. This discussion will create fluency in training application and communication regardless of the species, facility, or trainer.

The panel included:
Jeff Andrews, Vice President of Zoological Operations, Busch Gardens Tampa
Chuck Tompkins, Corporate Curator of Animal Training - SeaWorld Parks & Entertainment
Susan Freidman PhD, www.behaviorworks.com

Killing Keiko: A Cautionary Tale of One Whale

Mark A. Simmons
Executive Vice President, Ocean Embassy, Inc.
Managing Partner, OERCA

Millions *of Free Willy* movie enthusiasts have been led to believe that Keiko's return to the wild was a triumph. After the syndication of the film Blackfish, Keiko's story once again became a rallying cry for anti-zoo proponents calling for the release of other killer whales in zoological care. But according to author Mark Simmons, director of the Keiko Animal Behavior Team on the Keiko Release Project, the whale's riveting story is one of unnecessary tragedy. This lecture, *Killing Keiko: A Cautionary Tale of One Whale,* unveils the shocking evolution and collapse of the whale's rehabilitation, covering his final trek across the North Atlantic to his heart-wrenching death in Norway. Simmons discusses the most influential factors, covering theories behind the rehabilitation plan, behavioral excesses and deficits, the organizations role in the outcome and the concept of captivity and the modern zoo. In life, Keiko was undoubtedly the most famous whale in history. In death, he became the most famous case of animal abuse the world cannot yet fathom. Simmons illuminates the true story of Keiko's journey and shows why it is more important now than ever before.

Mark began his career in 1987 in marine mammal behavioral sciences, working almost exclusively with killer whales. In 1998 he formed a consulting firm, Wildlife International Network along with highly regarded marine mammal expert and close friend Robin Friday. The following April of 1999, Simmons joined the Keiko Release Project as the director of animal husbandry and led the behavior team on-site in Iceland. There he authored and applied the behavioral rehabilitation blueprint for reintroduction that gained approval from the Icelandic Ministry of Fisheries for Keiko's formal release. Simmons went on to create Ocean Embassy, whereby his team assists governments on protective marine legislation, participates in ongoing research with marine mammals and is heavily involved in the rescue and rehabilitation of sick and stranded animals. He has provided consulting on marine mammal health assessment and recovery, training program evaluation and development, and zoological program management to numerous agencies such as NOAA/NMFS and facilities worldwide in the United States, Mexico, Singapore, Bahamas, U.A.E., Philippines, Iceland, Jamaica, Panama, China and St. Lucia. Simmons also created and continues to provide visionary leadership of a large-scale research and conservation database called OERCA that serves global wildlife management needs. He has taught marine mammal behavioral science at the University of Miami and conducted numerous seminars and public lectures on the Keiko Release Project.

Advance Reinforcement Concepts Combining Science with Common Sense for Optimal Animal Behavior

Thad Lacinak and Angi Millwood

Precision Behavior

“The way positive reinforcement is carried out is more important than the amount.” These wise words from B.F. Skinner are as true in modern zoological training as they were when first uttered. As animal training consultants working with facilities worldwide, we often see the same challenges over and over again regardless of the focus species. Frequently, these difficulties are the result of predictability and lack of correct application of some of the most effective tools at the trainers’ disposal. This workshop will discuss advanced reinforcement concepts that can benefit all trainers whether they work with dolphins, dogs, alligators or macaws. Topics will include a variety of strategies for avoiding predictability in animal training programs such as choosing the best reinforcement schedule based on the circumstance, ensuring variety in the types of rewards offered, advanced bridging strategies and exploring the latest research on the neurotransmitter dopamine and its relation to “maybe.” We will also explore many of the most frequently misunderstood ideas or strategies in animal training such as the purpose behind and application of the least reinforcing scenario (L.R.S.), use of the Premack Principle, and the role of deprivation and satiation as they relate to reinforcement effectiveness. Although this is an advanced workshop, all concepts are explained in depth with real-world examples. The goal is to arm trainers with information and tools they can implement immediately into their daily training routines for the continued growth of the animal training field.

Lunch and Learns
Guardian Angel Dog Rescue and
Mutts with Manners

Lunch and Learns took a new twist this year in Tampa!

Guardian Angel Dog Rescue is a non-profit animal rescue that is dedicated to rescuing dogs from needless euthanasia. Doing what it takes to help stray dogs and owner surrenders, including getting medical treatment at a vet, and finally finding these dogs good and loving homes. This year at the annual ABMA conference, we will be showcasing a couple of foster dogs as they begin their training with ABMA members Heather Samper and Trelle Dandridge from Mutts with Manners. During lunch on Monday, Wednesday, and Friday bring your lunch and watch these dogs as they start their training from the very beginning and progress through the week. These animals will be highlighted on social media to raise awareness of the organization and aid in finding these animals a forever home!

Behavior Management Fund Scholarship Winner

“Here and Now with Your Animal”- Techniques to Improve the Mental Awareness of Trainers and so Enable More Effective Training

František Šusta and Petra Jaškówová

www.trainingisdialogue.com

Successful training is a result of trainer and animal participating effectively. Practically we focus on the behavior and physical state of the animal. But more experienced trainers know that the internal state of the trainer is a large part that cues responses from the animal. As trainers, our focus, ability to be mentally present, and our stress levels directly influence our training success. It is a sad reality, that traditionally connected humans believe they have dominance over animals. This “internal” belief system translates into a subconscious argument between animal and trainer which results, sometimes even with the best intentions, in aversive training methods. This contrasts with science based R+ training which focuses only on the animal choosing the required response. And for many trainers the aversive methods “speaking about their soul” are still more popular than R+ training “speaking only about science.”

To address this concern we developed a new method of teaching R+ training. It includes relaxation techniques for the trainers, concentration and breath exercises, and different modifications of clicker games. It is designed to provide trainer’s with more self-awareness in training process, and so enable them to communicate effectively through operant conditioning. Examples of how problematic animal behaviour was solved using this techniques will be illustrated. We will show how R+ training skills like LRS, rhythm of work, managing of animal´s stress and others are taught this way. And we want to show how trainers do “find their own souls” through clicker.

Introduction:

Modern animal training based on positive reinforcement is a successful and practical philosophy, which is being spread in many areas of common life of humans and animals. By its means, various problems in animal behaviour can be solved or the trained subject can be taught complicated actions and voluntary cooperation during veterinary operations. I (František Šusta, the first author), as an exotic animal trainer in zoo, have used this philosophy at work for many years and neither me, nor my colleagues have ever thought of leaving it. To us, trainers of exotic wild animals, it offered everything we need for our work and basically was the only choice for solution of majority of difficult tasks.

Since 2012, within the frame of my private practice, I have been gradually moving myself among the trainers of dogs, horses, and other domestic animals. Here I can clearly see, that among private animal owners, the attitude to positive reinforcement training methods is not as clear as with professional exotic animal trainers. A lot of animal owners have tried the positive attitude, but did not reach the results they wanted and returned back to the traditional methods. Many of them do not even approach positive training, because it does not fulfill what they are searching for in it, not for the animal, but for themselves. Many of them endure in the positive attitude, but are continually frustrated. And they are not frustrated just themselves, but the animals as well.

Especially for private pet owners, it would be thus necessary to make a positive training tutorial which would motivate and inspire them. Such a method, that would specifically work with the trainer´s inner state and only after his/her adaptation, would focus on the animal. This new procedure, provisionally called "Here and now with your dog", is taught in a pair – a professional animal trainer (František Šusta) and a „life coach" (Petra Jaškówová).

The exercises we use originate from what we have both learned in various fields and domains. We top them up, evolve them, and confirm them based on our own professional experience. As authors, we go across fields like personal development, animal training, physiology, brain-based cocaching, theatre, yoga, etc. The exact description will be further shown in the methodology:

Why work with the inner state of the trainer?

We see four main reasons:

1) The first reason is purely practical – trainer working under pressure from the environs makes methodical mistakes in the training. In many cases, because of his/her urge to reach an outcome, he/she increases the pressure to the subject to such an extent that the whole concept of positive training falls apart. Although there are tidbits and other rewards featured, the training further proceeds on an aversive basis. In the case of dogs, such change of "training overtone" because of an excessive focus of the trainer usually takes effect in worsening the results: worse understanding of trainer´s demands or impossibility to carry out a step in training (e.g. removal of target), reluctancy to accept rewards, sniffing in, scratching during the training, or other escape strategies. While working with non-domesticated animals, the increase of pressure from the trainer´s side usually leads to loss of motivation and end of training, misunderstaning of demands, or aggression directed at the trainer.

How can the only change of the inner motivation of the trainer change the basis of the training? Firstly, as we have mentioned before, the trainer makes methodical mistakes under pressure. Trainers under pressure, for example, inadequately accelerate the rhythm of the work. Very often they give the cue for the behavior at a time when the animal is still consuming the reward and is not focused on the cue. Usually, they do not give time to do default behavior at the right time and the result is the growing nervousness of the animal. This eventually leads into the loss of motivation or aggression. The trainer under pressure often continues to insist on the animal doing the task, even though the animal apparently has a problem with it. In order for success, it would be better to go a step back (back to kindergarten) or include more suitable, simpler taks for increasing the success rate.

Under pressure we often do not use LRS, resp. we do not give it necessary time etc. Shortly, the list of methodical mistakes the trainer under pressure easily slips to and which can lead to an injury is long. For comparison, we quote quantified assessment of two trainings that the author of the first article lead with llama alpaca. The first is a standard training with the presence of colleagues, the second a show for an important visitor – Ken Ramirez. This particular show was, according to our records, the author´s worst show with llama alpaca in the past year with a big amount of methodical mistakes.

Table 1

01.06.2015, show for Ken Ramirez									
Cued behavior, DB	Number during lesson	reaction on cue	Was default behavior reinforced?	Animal is offering other behior when confused	Lost of motivation	Aggression	Sume	Maximum possible	Percents of success (%)
		plus 0 - no behavior plus 5 - behavior done	plus 0 - no plus 5 - yes	minus 3	minus 3	minus1 -blocking trainer minus 2 - spiting minus 3 - kick or another bodypart attack			
Target	25	120	/				120	125	96.00%
Distant target (high energy behavior)	6	20				-3	17	30	56.67%
Jump over hurdle (high energy behavior)	4	15	/			-2	13	20	65.00%
Retrieve me something	3	15	/			-1	14	15	93.33%
Follow left leg	2	10	/			-3	7	10	70.00%
Distant station (on cue or "big" default behavior)	/	/	/				0	0	
Station on trainers left side (small default behavior)	4	/	10			-2	8	20	40.00%
Sume	44	180	10			-11	179	220	81.36%
Maximum possible	/	200	20			/			**Average success for each trained behavior**
Percent (%)	/	90.00%	50.00%				92.63%		**70.17%**

Table 2

Standard show, April the 14th of 2016, for 200 children									
Cued behavior, DB	Number during lesson	reaction on cue	Was default behavior reinforced?	Animal is offering other behior when confused	Lost of motivation	Aggression	Sume	Maximum possible	Percents of success (%)
		plus 0 - no behavior plus 5 - behavior done	plus 0 - no plus 5 - yes	minus 3	minus 3	minus1 -blocking trainer minus 2 - spiting minus 3 - kick or another bodypart attack			
Target	5	25	/				25	25	100.00%
Distant target (high energy behavior)	3	15					15	15	100.00%
Jump over hurdle (high energy behavior)	3	15	/			-1	14	15	93.33%
Retrieve me something	2	10	/				10	10	100.00%
Follow left leg	5	25	/			-1	24	25	96.00%
Distant station (on cue or "big" default behavior)	3	/	15				15	15	100.00%
Station on trainers left side (small default behavior)	20	/	100			-2	98	100	98.00%
Sume	41	90	115			-4	201	205	98.05%

Maximum possible	/	90	115			/			**Average success for each trained behavior**
Percent (%)	/	100.00%	100.00%				92.63%		**98.19%**

2) Another example of a positive training debacle including the trainer´s nervousness is when the trainer, under pressure of the environs, clearly overtakes the responsibility for the result of the training and thus takes it from the animal. Let´s think together about the connection of a training led on R+ principle and a training led on R- principle

OUR GOAL	TO CREATE BEHAVIOR	
Method	R+	R-
Simplified definition	Animal does the behavior to reach something it wants (for example treat)	Animal does the behavior to escape from something it does not want (for example pressure)
The „animal´s goal“	Reach the reinforcer	Escape from the pressure
What is the body feeling the animal could attempt for? (choose from normal/joy)	joy	normal
The goal of the animal as about hormons inside it´s body – really simplified (endorfine/cortizol; increase/decrease)	Endorfine increase	Cortisol decrease
Can the animal reach the limit in this hormon process during training? (yes/ no)	No (the endorfine level can increase without limit and so maket he animal to be more in feeling „joy“ as above – yes, we know there is some limit, but we will probably never reach this limit during training process)	Yes (zero of cortisol level , resp. minimal physiological level of cortisol in the body makes the animal to escape from stress and to be in feeling „normal“ – as above)
So, is there any limit in the effort the animal will give in the training? (yes/ no)	No (because we will never reach the upper limit of endorfine concentration)	Yes (because the animal is able to reach the level of minimum cortisol, the physiological zero f cortisol)
So who will give more effort to the training process? (man - trainer/ animal - learner)	Animal - learner	Man - trainer
So who has finally bigger behalf on the goal and then TAKES RESPONSIBILITY FOR THE BEHAVIOR? (man - trainer/ animal - learner)	Animal - learner	Man - trainer

From the table above, it is evident that if the training is based on behavior enforcement through reward, the successful behavior is connected with pleasant feelings, the rise of endorphins (which, in this process, never reach their “saturation“). From this cause, the R+ training is basically unlimited concerning

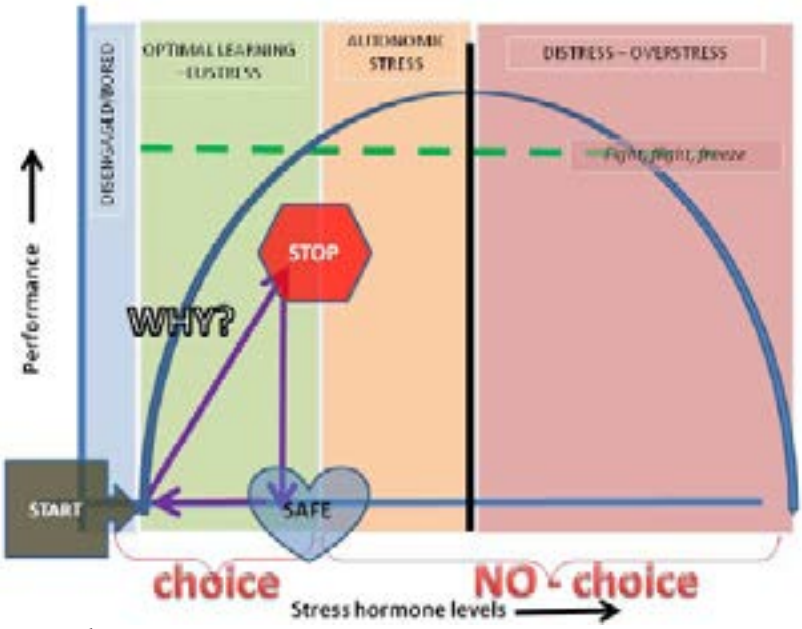
the effort put in the training by the subject trained (of course, in practice, the energetic value of the reward etc. plays a role, anyway, thus the system is basically unlimited). In case of R- training and pressure, the animal having fulfilled the task, goes from an unpleasant feeling to normal, so the case is that the level of stress hormones is reduced to minimum (theoretically zero). This minimum level is reachable in training and thus presents the limit. After the minimum level is reached the animal no longer has the reason to work. The result of these differences is that in positive training the animal actively overtakes the responsibility for the result and and often prompts the trainer to train more. In training through R-, the trainer takes on the responsibility and the animal gives it to him/her without the possibility of getting anything more than relief from pressure.

The result from the above stated is that if the training is supposed to proceed in the R+ style, the trainer has to let the animal have the responsibility for the result and not take it on himself/herself. This, however, is not easy under the pressure of the environs and the stress of the trainer. If an important person is watching you, the time is pressing, we are being assessed, we evidently take on the responsibility for the training result and the animals gives it to us. Its activity decreases and often the trainer, without even noticing it, makes more physical activity during the training than the animal itself. In another case, while transferring from positive to negative training, the animal secures its peace and relief in other ways – walks away from the contact bar, flies away, climbs a tree, attacks the trainer. All of these are the results of violation of inner balance of the trainer, which did not agree with positive training.

3) A significant reason for active control of the trainer´s psyche in contact with the animal are the external signs of stress, which then become part of the stimuli for the animal. This is vital especially with dogs, the motivation of which, except usual primary reinforcers, often stands on an inborn urge to "make the master happy, do something for his man." The stress in a human body (like in an animal) goes along with a waterfall of stress hormones. The concentration of these hormones in the body of trainer grows, and taking into consideration the olfactory abilities of dogs, it is probably detectable by olfaction. In the connection of a dog handler and a dog by leash, in the case of the dog handler´s stress, there is vibration of the leash and transfer of that stress to the dog. This all informs the dog of a problem situation which it can have the tendency to solve. The stress of the dog handler does not have to be caused by an external impulse, but by a memory in his head - even a story that the handler is going through inside his head, but the dog cannot see. On the other hand, the dog can connect the signs of the handler´s stress with an external, originally neutral stimulus (e.g. a particular type of person - referee at the exhibition, member of a larger family visiting) and later start reacting to him as significant (thereupon starts being afraid of the referee or attacking that member of the family).

In 2014 the theory of stress triangle was published (ŠUSTA, HARRIS,SULLIVAN, 2014). It implies, that for successful training by operant conditioning (which includes R+ training), it is necessary to keep the state of the animal under the limit, which is called FFF (see picture).

Above this limit, learning can also happen, but the level of stress does not provide conditions for operant learning (which R+ training stands on). The article further states, that for keeping the animal below this limit (green zone in the picture), it is necessary to give it answers to four questions: START (how can I start training process?), STOP (How do I stop stressin event?), SAFE PLACE (Where can I relax to get to the original state?), WHY (why do I take part in the training, what is the reason?). From the picture, it is evident, that the distance between the START and STOP positions directly determines the load that the animal will accept during the R+ training without exceeding the FFF limit. This level of load will logically determine the duration of the training that the animal will cope with before it needs rest. Which of the positions at



Stress Triangle

START and STOP can we, as trainers, shift the distance between them as long as possible (thus the amount of acceptable load)? We won´t be able to shift the STOP position too much because this question is for the individual, basically when close to the FFF limit, and hence its position is fixed. On the other hand, the state, when the animal asks for START is depending on the circumstances different. In which place of the "stress hill" the particular START place of the animal is found directly determines time and load, after which it gets to the question STOP, respectively the FFF limit. The ideal START thus lies as low as possible (the animal is relaxed to the maximum), so that the distance from the STOP is as big as possible.

Where at the moment of contest, exam, show and other important events is the START of the human, the trainer of the animal found? If the trainer lets himself be influenced by the stories in his head and succumbs to the pressure of the environs, his stress level will be considerably higher than the optimum START position is. The dog, who perceives this state and can´t understand that it is the trainer´s reaction to his „inner story", levels up to his state – it gets ready for the threat too. So, the distance between START and STOP (respectively FFF) is thus shortened in the dog´s case and everything leads into his mistakes, nervousness and reactions, which he does not have in training (when his trainer is relaxed).

4) We see also the fourth vital reason for work with the trainer´s psyche in positive traning in the motivation of particular people to train in certain ways. In my private dog trainer practice, I encounter various dog owners who often obtain their pets to fulfil their inner needs of frustration, empty space, etc. What they expect from the time spent with their dog are not only practical results like sports performance or property protection, but also fulfilment of their inward needs. Positive training should, theoretically, be ideal for that …. anyway, the reality in the Czech Republic is that when confronted with scientifically proven methodology of the R+ training, these people are often confused and frustrated. Logically they know that this methodology is going to work and is the best for their animal … but without the connection with "spiritual dimension", it does not give them, the owners, the fulfilment they were looking for.

In contrast with scientifically based positive training methods, we find procedures in practice and various TV shows which may lack expert base, but trivially refer to spiritual dimension and work with the

trainer´s psyche. It is sad that these methods place the human into the dominant role and the success in the animal training dependent on the expansion of the "inner power" and demonstration of dominance. Even though such methods in practice often do not lead to big successes such as positive reinforcement alternatives would have, they bring the important things – spiritual dimension and "food for the human soul" to the frustrated pet owners. While in animal training in the zoo, apart from the animal welfare, the practical result is important, whereas the feeling and spiritual fulfilment of the trainer are in the second place. With private owners, trainers good feeling is on the other hand important. And so, while with professional training of exotic animals, we often ask "what is in it for the animal", while working with private owners of dogs and other pets, we have to ask "what is in it for the trainer." And that can be one of the reasons, why we as exotic animal trainers, after trying positive methods and finding out their obvious advantages, do not leave them. A lot of private dog owners after trying these leave them or search for the way to fulfil their own needs too. For the R+ to be able to compete with other methods with these people, it has to fulfil the trainer´s soul, get its spiritual dimension.

Procedure – training method:

Our procedure consists of four evening meetings; first three proceed without the dogs and participants work only on themselves (or work together). The fourth meeting proceeds already with dogs and we practice what we have learned during the first three meetings. The course emphasizes personal participant's experience of specific frame of mind. We are trying to theorize as little as possible, and we let participants to go through various training techniques from the trainer's and from animal's point of view. Based on this, participants discover each training principle by themselves. The sequence is following:

1) Stories in our head form a barrier for our understanding (from R+ training perspective –we are creating right conditions for operant conditioning).

Here we discuss various types of learning from the animal training perspective, specifics, and advantages of operant learning and its necessary requirements. We are learning not to develop labels about trained subject – that would create an obstacle for otherwise successful work.

Description of the exercise:

Participants are divided into trainer/animal couples and then they play the well known free shaping clicker game. We assign them intentionally confusing assignments. We intentionally create stories in their heads that will obstruct their training. For example, in the center of the room there is a clearly visible pile of items but the behavior that the animal shall learn is to do a "dove pose". People in the role of an animal became frequently frustrated, as much as people in the role of the trainer. Each of them has some expectations, some story, because everyone knows something different and has different experience. In that state of mind, clicker – at this point the only communication channel – cannot relay necessary information. Stories and expectations in their heads are those barriers for their understanding. There are many failed attempts and people in the animal role ask themselves "What do they want? What I haven't done yet? Others would have been already finished, why I'm still stuck?" When the game ends, we present the following table of selected forms of learning. The participants discover what form of learning they employed. The information in the table are really simplified to be useful understandable for nonscientific pet owners.

Kind of learning	**Definition**	**Animal needs active awareness about TIME …**	**Animal needs active awareness about PLACE (and body) …**	**Animal needs actively focused on**	**Does high stress of the animal evidently disturb this way of learning?**	**Advantages/ disadvantages**	**What would be the question in "animals head"?**
Habituation/ Sensitization	See https://theabma.org/glossary/	The moment NOW	HERE	nothing	no	Primitive way of learning which all the animals are able to do. But useful just for very simple information.	No question is needed
Classical (pavlovian) conditioning	See https://theabma.org/glossary/	The moment NOW	HERE	The animal has to perceive the new stimul and at least must know about the "original important" stimul.	no	Creates very strong reaction of animals body, which is not able to control voluntary. But many times it creates body feelings which trainer did not want to. Useful just for simple behaviors.	No question is needed.
Generalization	See https://theabma.org/glossary/	The moment NOW	HERE	The animal has to perceive the new stimul and it´s similarities with original stimulus.	no	It is important for the animal to be able to generalize new learned behaviors into new situations and after similar stimuli. On another hand trainer can not directly influence how the animal will generalize, it depends a lot on species and individual abilities and itś focus on details.	No question is needed.

Operant conditioning	See https://theabma.org/glossary/	The moment NOW	HERE	The animal has to perceive itś own body movement, the behaviors and the consequesnce of this behavior.	YES	The first way of learning in our table, which can be used to teach complicated behaviors. On another way this is the first way learning in our table, which is really disturbed by high stress level.	In good training and with good timing no question is needed.
Imitation	See https://theabma.org/glossary/, in term Observational Learning	NOW + history not long ago	HERE and next to the animal; two bodies - the trained animal and the subject the animal imitates	Needs to oerceive itself and the subject the animal is imitating. Needs to understand the similarities between their bodies or behaviors.	YES	Can be used also for complicated behaviors, but commonly does not create the full behavior in all the details. High stress level is disturbing in this way of learning.	"How did he do it? How can I do it after him? How do we resemble?!"

Insight	My own very simplified definition: Understanding things and processes all around which is based on personal experience of the individual, analysis of these experiences and creating new plan. We can say, this is "learning through personal stories"of the individual.	NOW + history + future	Could be about many places and many bodies	Needs to perceive itself behavior and consequence in history, the things all around in environment, on story in mind and the plan for future…., very complicated way	YES	This way is typical for us, humans and it leeds to great new behaviors. But we, humans, created language, letters,symbols and many other aids which do help us to learn by insight, to create the same stories in mind of somebody else as we do have. But our animals do not have these these aids to translate the stories from human minds So, it can happen, but can not rely on it in practical training, although it has been proven on some species.!	"How does it all work? How does it all fit together? How does it fit with me? What do they probably want? Did I already try that? If I will try that, could I follow with anything alese?" …many many question are possible!

Participants then understand that in the game they were learning by insight – the evolutionary most advanced form of learning – it is not entirely impossible with animals, but it was proven only for some species. For humans it is natural to learn through insight and therefore we automatically expect that from animals. However, we humans simplify our learning through insight by translating it into thoughts, words, ideas, which our animal does not know. Words and ideas help to create our story in head of our counterpart, so an insight can happen. With dogs, such option doesn't exist so we can rely only on operant conditioning – the first from presented forms of learning where we can teach complex behavior, but the last one where we can stay in the current moment and we don't need to reach into the past or into the future (so it doesn't require to have some story in our head). Participants practically understand that to be successful with operant conditioning, it is essential to be present here and now.

2) To be present "here and now" means to completely discard stories (from R+ perspective – to remove all labels).

If the trainer lives in some story in his head during the training, this story seriously limits success of operant learning of trained subject. That story blocks learning process; it can be also a label – for example "that animal is dominant, it is fearful", and so on. In general, it is considered as an obstacle in operant training – and labeling an animal instead of using operant definition of its behavior is a serious methodologic error.

To be able to pause our mind – a mind that endlessly creates new stories and labels about our animals – we need some practical tool. In our workshop, this tool is breathing, mental, and concentration exercises.

Description of the exercise:

Thought overload and expanding those thoughts into stories in the head creates stress and pressure on the trainer. It proved useful to us to work with attention by intentionally shifting it and our focus to somewhere else. To stay here and now we define as "to dedicate our full attention to what is at that moment in a given space and to not shift it away to the past or to the future".

We also utilize knowledge from modern neurosciences. – by our decisions to where we focus our attention we also change our brain and we change how we perceive the world and how we communicate with it.

In the beginning, we teach how to focus our attention using breathing exercises. We learn how to move attention from the stories and thoughts, which disturb our attention and our energy, only to our breath. In the next step we "teach how to breathe" and how to utilize more from the capacity of our lungs – that capacity we do not use in our normal lives because of our stress. Based on our experience, many participants do not use phrenic breathing. Deep and relaxed breathing into the stomach increases stability of the body and mind. This can be achieved by specific exercise.

Exercise for stability in pairs – 1) breathe to the chest, 2) breathe to the stomach. Our participants therefore learn again how to use their breath how it is natural for us when we are relaxed and full of energy, concentrated in the moment, "here and now".

During our next sessions, we develop breathing exercises into mental and concentration exercises and that deepens fore mentioned benefits. This opens our true inner potential that is not limited by trainer's stress.

3) Remain "here and now", recognize incongruity and return to mutual understanding (from R+ training point of view – default behavior and LRS)

In the second meeting, we are learning how to remain "here and now" during the training session – that state we achieved with the breathing exercise.

Description of the exercise:

We play again the clicker game, but with modified rules. The game begins when both "trainer" and "animal" together achieve "here and now" state through breathing exercise. At that moment, the clicker game begins. At this time, the game shows improvement on both sides.

If "trainer" or "animal" feels incongruity (when training is not operant – their mind is not just "here and now", when head begins to construct analytical questions and stories), they inform their counterpart about that and the game pauses. Trained subject returns to the last successful step and before game continues again, both parties take several deep breaths to achieve "here and now" state again. After that, the game usually smoothly proceeds towards successful finish.

From the R+ training perspective, the state when both players take several deep breaths becomes the "default behavior" that is required for calm and successful training. This default behavior implements STOP function in our stress triangle mentioned above – if I don't understand what should I do and I became tense, I assume this position, which is a SAFE PLACE for me (as long as I'm in this position, I surely don't do anything wrong and nothing is required to do from me). An interesting fact is that majority of participants take three deep breaths, or count to three. Therefore, they automatically synchronize with optimal 3 seconds in LRS. In addition, in optimal game the first click appears right after the break for the position itself, or the first hint of success; the parallel with LRS is more than obvious.

4) Be focused on the animal, not on your goal (from R+ training perspective – the rule of small steps in shaping, optimal fulfillment of shaping plan, back to kindergarten, release criteria)

An unmistakable sign that the "trainer" in our game is not mentally present is a small frequency of clicks and high number of unsuccessful attempts on the "animal" side. This situation emerges when the "trainer" with each next click waits for the moment when the "animal" accomplishes partial goal, which is planned in advance by the "trainer". For example, an "animal" approaches the shelf full of items and the "trainer" clicks only at the moment when "animal" grabs one specific item. But before that happens, the "animal" looks at the item, touches the shelf near that item, tries a few items in close proximity of that item. That was behaviors that were closer to our goal, but were not confirmed by the "trainer" because the "trainer" waited just for one specific thing. That partial goal that he planned – next step in shaping – is merely a story in his head. Such "trainer" is not "here and now", but in his story and such training is full of failures for the "animal". Nevertheless, the "trainer" does not see that, he only waits for the moment when his partial goal will be met – he is focused on his goal, not on the animal.

Trainers that are focused on partial goal instead of an animal do usually another systematic error – when "person in the animal role" descend from the right path and so he does not hear clicker, he usually returns to the place where he's heard clicker for the last time. At that moment a good trainer would click as a sign that the "animal" returned to the right place (one step back, back to kindergarten) and then he'd continue with correction using smaller steps (release criteria). With its return, the animal asks for the message whether it returned to the right crossroad and what direction is the right one. But a trainer focused just on a partial goal doesn't see this request – he doesn't see the whole animal. He just waits until the goal is reached. To correctly teach, the "back to kindergarten" technique is the main requirement for successful positive training. This technique is – besides LRS – the second small stress triangle, where return plays the role of STOP, the place where everything was right, it's SAFE PLACE (that is why the trainer has to mark that place) and further continuation is START.

Description of the exercise:

When we discover these flaws in clicker game described in article 3, we stop the game and before next breathing exercise and continuation, we shortly discuss with player in the "trainer" role, or we put him for a while into the "animal" role in the same situation.

To unfasten attention from partial goal and to focus just on the animal is not easy for many people. To concentrate on the animal means to SEE IT HOW IT REALLY IS, hence ACCEPT it completely. Therefore, ACCEPTANCE becomes main topic of our next work.

5) Acceptance is the first step towards the change (from R+ perspective – an optimal start of shaping, establishing the first step)

What does acceptance mean from our point of view? In

our work, we define acceptance as "to not develop our inner resentment towards what IS, whatever that IS means." Also, "feel what IS without any inner judgement and without having any opinion HOW it is." When we stop having our own subjective opinion about a specific situation, event, moment, person, or animal, then we will finally free to feel. In practice, we stop translating our thought into words and instead of saying, "my dog is neurotic, fearful, crazy, and so on", we change our inner attitude to "it IS." Then we can use our "it IS" attitude in relationship with other people, events, or with ourselves.

From the animal trainer perspective that moment of acceptance becomes the first step of shaping. After all optimal shaping begins with what the animal already knows. Shaping of the world around us, shaping of our lives, it all must inevitably begin by accepting the reality how it is. After we accept that reality, we can change that.

Our common problem is that we do not take reality as it is, but as it should be. Our dogs (and other animals) are described in clever books by various standards. They should fulfill various roles… and we see them as an instance of that standard, not as specific real animal. Yes, we can teach them so they comply with such standard, but we have to start from the situation as it actually is. Therefore, we need to see it and accept it – acceptance of reality is the first step towards its change.

Description of the exercise:

The exercise that helps us "to accept the other" is so called "clicker dialog." Right after that exercise, many participants understand and experience for the first time what it really means to accept the other how she is. They also develop positive attitude to the clicker, which is for many of our participants is connected with unpleasant feelings of the trainer who is not sure enough with himself, is afraid of errors, and who experience frustration (fear of "misclick").

The exercise "clicker dialog" proceeds first between two persons, each of them have their own clicker. In this game, the clicker becomes our language. The players have a simple assignment: to discuss just by clicking their clickers. In practice, the player does not say her message with words, but with clicks and her partner replies. "Clicker dialog" then continues quite normally, as if two persons were naturally talking. And as in normal discussion, people sometimes cut in when they don't listen each other. When players click simultaneously, we consider that as a moment when they didn't listen to each other – they were creating own stories in their heads, didn't accept the other, and didn't play the game right. The exercise proceeds in two variants – when the players look at each other and then without visual contact. They say playing with closed eyes is much more successful because without the opportunity to see, the player doesn't develop any expectations and stories about that person in front of him.

Participants usually perceive this exercise with certain dubiousness. After they have their clicker-chat, they experience its benefit and realize new perspectives this exercise offers. During the first few moments they realize that the condition for a successful game is not to create a plan in mind, to not add their own story to the game, to not cast any expectations on their co-players (to not create labels). For successful clicker dialog it's simply important that both players are "here and now", to be relaxed and focused on clicking and be free from excessive thoughts. Among the most common benefits for players, they are now able to answer following questions:

- How balanced is my communication? (Understanding how much do I talk and how much and how good I listen)

- Do I rather let the other one talk?
- Do I talk too much and I don't let the other one to talk?
- How do I feel in communication with the others?

It happens frequently that this exercise downright fits and enables players to be nicely tuned into their communication – communication that brings them joy. Afterwards, the use of clicker itself is then con-

nected with good feelings, disengaged from original concerns. We genuinely start to "play".

We then further expand our "clicker chat" exercise – the whole group communicates through the clicker. This collective clicker chat proceeds in three levels of difficulty.

1. Players stand in a circle and each player clicks once in the given order. The goal is that clicks follow smoothly and the rhythm and pace of the group is established.
2. It is not specified who will click and when, but still each player clicks once. Instructor counts in his mind and stops the game when all players have clicked. When two or more players click together, we consider that as an "error". The goal is to establish mutual perception, which is so intense that everyone "feels" that own moment when to click.
3. We do not count clicks and players simply click when their moment comes. The mutual perception is usually so strong that more players click together after minutes of the play.

The benefit of these clicker games is not only improvement of communication skills, but also deepening perception of participants and their ability of concentration.

Another exercise – roles: It is a homework, which participants do in the days between seminars. Their assignment is to honestly focus on who their animal really is.

In our ordinary lives, we do not quite often realize what roles in our lives we have assigned to our animal friends. Intentionally, but more often subconsciously, we see them through these roles. Moreover, we rather perceive that role – the role that our animal willingly plays – than our animal itself. To be open and sincere to myself and to realize what roles I have assigned to my animal, to acknowledge that I did that – it is usually a great relief and the first step towards to truly perceive the animal.

6) <u>What does it mean positive training as "learning by success"? What we consider as success (from R+ training point of view - successive approximation, rule of small steps in shaping)</u>

What is actually that success which in positive training we mark and reward? We already know from article 4 that if a trainer considers a success that deserves to be marked and rewarded, only that single "hit" to the target he specified beforehand, it logically results in a great amount of failures (in our game there was frequently 10 failed attempts per one successful attempt). This we cannot consider learning by success and the stress and frustration of animal (or player in the role of an animal) corresponds to that. In order to have the number successes exceed the number of failures, the trainer must unbound his focus from what "should have happened" and focus on "what is". So in fact accept the animal how it is, accept its current behavior as a first step in shaping and as a success mark anything, what is even a little above the current state. In summary, in order to teach by successive approximation, we must see that success. To see that success, we have to accept basic state, reality, how it is.

Description of the exercise:

This moment of "acceptance of the animal how it is" is in practice very soothing for both sides. We achieve that primarily by discussion with participants in exercises, or in homework.

7) <u>Self-acceptance, creating own bubble as a "SAFE PLACE" (from R+ training perspective it's basically auto training, a transfer of principles we have learnt to own lives)</u>

Even when we accept our animal how it is and we set conditions to learn by success, there is always another side of the coin – trainer must also accept himself. We usually have stories, expectations, ideas, and standards about ourselves. Whether these standards come from our surroundings, or we came up with them, it keeps us from accepting us how we really are. Moreover, as long as we do not accept ourselves, we cannot do that first successful step in "shaping of our lives". Many people struggle at the beginning of that change "to who they should be". They cannot do that first step, because the difficulty of that first step is too high; they set the difficulty level based on their idea about themselves. One is still unsuccessful in his effort

to change, his dissatisfaction with own life raises and so his stress level. This stress in a human is perceptible for an animal (as we mentioned at the beginning) and so even though one practices positive training with an animal, the reality is different and positive training is unsuccessful.

Self-acceptance is a key to be able to accept everything around us. Also here applies what was already said. To settle "just" with I AM, to accept ourselves as a human, is often a long run. In the workshop, we can at least come close to such acceptance. We focus on accepting ourselves not as a complete person, but just as a trainer. It is not easy, because it is a complete person who is in a role of trainer. It is a person who is unique, who has many unique aspects. A person who has his own capabilities, skills, and talents; own challenges and problems he fights, own history and experience, authorities that formed him. It is very individual to what extent we accept ourselves as a trainer. If that happens, there comes great relief and the participant for the first time finds even what he expected from getting an animal – that relief for own soul, own safe place in the world. With many participants, who express interest, the second author of the article continues to work with her private life coach practice. We do not do an actual practice at the meeting; self-acceptance is a part of discussions and whole work from the third meeting.

<u>To appreciate and to receive appreciation</u>

In the same meeting where we talk about self-acceptance, we also work on ability to appreciate ourselves, as well as appreciate others and ability to receive appreciation from others. According to old wisdom, it goes: "That, what is up, is also down." Moreover, it is true that "what is inside is also outside". Macrocosm vs. microcosm. If we cannot teach by success ourselves, our effort to teach using positive reinforcement someone else doesn't have any support in our belief system. Our actions towards outside isn't clear enough. We consider this as very contributive to guide our participants to be able to develop their ability to appreciate themselves. By that we also emphasize what is successful and so we as teachers work in the spirit of positive reinforcement.

Description of the exercise:

Since our third meeting, after each clicker game our participants write down their appreciations. It is how they appreciate themselves, their co-players, or whole group. It is different in each situation, and teachers specifically assign what to write down. We pay attention that all appreciations that participants give to themselves or to others are specific, clear, and contribute to new understanding about themselves, about newly acquired abilities, or skills. We lead participants in this manner during the third and the last, fourth, meeting.

<u>Bubble – my safe space where everything is possible</u>

Work on self-development is very fragile. Some aspects might not be pleasant – so we pay close attention to work in safe and intimate environment. Exercise, that helps to create such atmosphere, is so called Bubble.

Description of the exercise:

Bubble is a playful exercise that requires certain level of imagination. With help of breathing each participant at the first meeting creates their own imaginary bubble around his/her body. That represents safe space, which supplies everything that he needs at given moment - peace, relaxation, ability to focus and concentrate. The relaxed and pleasant feeling that participants got from breathing exercise we anchor to this bubble. We define that what we store in the bubble is always at our disposal. Therefore, if participant decides to retrieve it at that moment when he needs to regain stability and inner calm, anchored feelings

and harmony emerge, so he quickly and efficiently achieves equilibrium. It is also true that the more I use my bubble, the better it works. Any energy I store inside, I also get back. To enter our virtual bubble we also have to choose a keyword or some ritual, that serves to invoke imaginary bubble (and connected feelings in state "here and now") in different life situations when it is needed. Experience has proved that technique of "invocation of personal bubble" our participants later successfully used in agility competitions, dog shows, or test, usually with very good practical result.

8) <u>Maintain the same procedure even under the pressure (from R+ training perspective, keep positive setup and precise methods in critical situations)</u>

While during first two meetings participants experience, understand, calm down and concentrate their minds, in the third meeting we put them under increasing pressure. This pressure should not "verify, whether they manage it". We increase the pressure gradually in the way that we are sure they will manage it, exactly in the sense of sentence we repeat with their dogs: "You shouldn't try whether your dog can do that, you teach your dog to do that!"

Description of the exercise:

We increase level of pressure gradually and we again practice that on the clicker game. First level is measuring the time – two participants play and third one is measuring the time. Participants decide when the game starts. It still holds that the game starts after taking deep breaths and in harmony. If one of sides involved experience disharmony, game stops and breathing exercise is in order (LS, default behavior). In the second level of pressure, we still measure the time, but the moment of start is fixed – the one who measures time counts to three and game starts. In the third level, we play within time limit, which can be gradually shortened. In the last, fourth level, the pair plays with fixed start, within time limit, and in front of audience.

The meaning of this exercise is that even under pressure players should stick to principles that they learned during first two meetings. At this point, they can use breathing exercise; invoke their "personal bubble" for "here and now" state (for ideal operant learning), successive approximation, setting the first step of shaping, back to kindergarten, and LRS. They can accept the animal how it is and based on that, setup the final goal – its selection is their choice and nobody tells them what specifically they should teach, the only thing binding is the time limit. They also already work on self-acceptance, not to affect progress of positive training by their stress.

With some participants, the pressure causes them suddenly to not use the principles they have learned. They don't spend their time with LRS, they are not focused on animal, but on partial goals and these goals are too high... if this happens for a couple on some pressure level, the couple stops and they "step back" in criteria. Practice shows that those who keep learned principles also under pressure, master the exercise. Most of participants also find out that in the present state "here and now" there is not even space "to be under pressure". What pressures us are the stories in our head, our expectations, our past, future, questions "what if". They do not exist in the state of "here and now". Most of successful participants of the game do not even sense the time limit, they act in the present. Moreover, they not only master that exercise, it's also pleasant. Some of them experience this pleasant feeling when competing for the first time.

The above mentioned clicker training "with added stress" is for calming down alternated with relief in form of breathing exercise, which is later developed into concentration on own senses – sight, hearing, sense of smell. Contribution of this exercise is in part the reduction of potential stress, in part a shift of attention to senses leads to strain them and therefore to the expansion of perception. Olfactory perception and inhalation of natural essential oils from hands proved to be very useful. Olfactory perception is the fastest way to address limbic system and stimulate it in the way that we are better prepared to start the training. Olfactory perception in connection with a relaxed state that participants experience is that anchor for moments when it is not so easy to be relaxed (a specific scent can be also a trigger to invoke our above-mentioned imaginary bubble). It happens that participants choose their scent, which they further use throughout the course, and in exposed moments outside the course.

Note: we use exclusively certified natural, therapeutic quality oils, without any synthetic compounds

9) **Customization for the use with animals**

The final meeting is all one big practical exercise. The participants bring their dogs or other animals. Within the scope of homework, they worked with them, but this time they work with them in front of other participants …. as a matter of fact under pressure. From the clicker man-man game, they have already mastered a series of principles (specified in the previous paragraph). These must be practically transferred to the animal. At the beginning of the meeting the whole group does a breathing exercise – an absolute majority of the dogs present, calm down during that. With the practical exercise with the dog (everybody chooses the task themselves), we put emphasis on the need of default behavior as a safe place (e.g. automatic sitting in front of the man), continuation only in case the pair is in accord, LRS application etc. With some pairs, it is again necessary to draw the attention to the "see the animal in the first place, not the aim" principle. With the exercises, the stress is not on the practical result (even though that is usually great too), but on the feeling of the human and behavior of the animal. That is why a lot of dog holders decided to take part in the seminar – because of their feeling from positive training.

The end of seminar and self-assessment

The end of each run belongs to assessment. The participants are led to assess themselves for the specific developments they have done during the workshop, individually, and in writing. Note that the most important realization, present particular evaluation to their animal friend and together, is to honour themselves as a team. We lead our participants to wake or anchor their inner integrity in themselves, realize they are the real experts for training of their dog and "shaping their lives". This attitude has nothing to do with the idea that they will not let anyone advise them. Rather, it frees them from excessive and limiting adher-

ence to what the people around think about them. The final certificate/diploma of completing the workshop are the above mentioned assessments, which they dedicate to themselves. The lecturers only sign them as an expression of agreement with what the participants wrote about themselves and their animals.

III)Results and conclusion:

It is difficult to present accurately measurable results with activities, which are focused on inner state of the trainer and his/her animal. It is true, that our graduates achieved a few particular successes in dog sports and at exhibitions, as well as with solving of daily critical situations. Above all, the interest of more and more people in these seminars and recommendations of former participants give evidence that their goal has been reached.

The amount of people, who have tried positive training before, but from personal reasons have given it up, is increasing ….and they now have decided to try it again, because it makes sense to them and fulfils their personal spiritual needs. There are cases, when, after the participation of the dog holder in our seminars and his "spiritual stabilization", with his/her dog, the agression to people or animals has substantially gone down, its fear of confined spaced has disappeared, its performance in work and sport has extremely improved (sports cynology, hunting cynology, agility…). With the exhibition dogs, the nervousness in the exhibition circle, including the final round, where their behaviour formerly failed, under the influence of the holder visibly disappeared. With the Prague Zoo employees (including the author of the first article), the performance with animals provably improved, especially with individuals tending to aggression and loss of motivation, the use of secondary reinfocers increased… simply, a whole lot of our animals started being grateful for being caressed.

The methodology and philosophy of the ,,With my animal here and now" has become a functional counterbalance to the methods, which without professional base, put stress on psychological power of the trainer and need of dominance. We show, that positive reinforcement does not only have practical results and scientific base, but also has soul, which so many private owners try to fulfil by obtaining their animal. The animal finally becomes a mediator for the owner to discover positive traning through finding, seeing, and accepting himself/herself through positive training.

In the end, we present some more ideas the participants of our meeting came to:

1) WAYS OF LEARNING

There are many ways in which animals including humans learn. We humans have, unlike animals, developed an ability of insightful learning. We rely on it even when animals use different ways to learn. It's an advantage for us because we can acquire complex skills. In order to learn by insight, we described the world around us with definitions and categories. But that actually slows us down, because we translate our thoughts into words and categories. If we want to react in the learning process as fast as our animal partners, we have to shut down your insight when it would slow us down and complicate things. Thats why we are learning to ,,work without the translation to words and analytical thougts" in this course.

2) WORDS

There are infinite number of versions of reality, in the universe and the world around us. When training animals, there are infinite number of ways to reach the same goal (animal's behavior). But the number of words, terms, and categories by which we describe the world around us is limited. If we percieve the world around us by words, we see only a fraction of the world and we miss the rest of the world. It's same with the behavior that the animal offers – if I define it with words, I will miss what doesn't fit the category. I would miss a behavior that would have led to the same goal, but didn't fit my prepared plan. Yes, we need to define clearly the goal (the desired behaviour) and we need to know the road to the goal roughly, but during the training, I should feel the animal without words and description. I need to see the animal, not the goal.

3) TO SEE THE ANIMAL, NOT THE GOAL

If you carry on with a shaping session in a manner that you decide what should be the best next step and you wait with a click until the step is reached, then you are looking at the goal and not the animal. It was you, who had chose the goal - the animal doesn't know it. It's quite possible that the animal is offering you a different way to the goal, but you are so narrowly focused on your current goal that you don't see that. Maybe the goal you have chosen is too difficult to reach for the animal. The training turns into a fight "show me that you can do it", instead of taking a friend on a journey. When we are training in a „show me" manner, it's inevitable that the number of failures increases, nervousness increases, and the realtionship deteriorates. If we work in a „I'm showing you the way", we will see the animal. The number of success will increase and the relationship and mood will improve. In order to achieve that, we have to accept the animal as it is.

4) ACCEPTANCE

One of the basic rules of animal training is that shaping starts with something the animal already knows. Shaping the world around us, shaping our own life, has to start with accepting the reality as it is. Only after the acceptance, we will be able to change it.

Our problem is that we often don't take the reality as it is, but as it should be. Even our dogs are described as clever by some standards, they are expected to fulfill some requirements. And then we see them as a standard, not a particular real animal. Yes, we can teach them to fit into the standard, but we have to start with the current situation as it is. So we have to see and accept – accepting the reality is first step to changing it.

Notice that during our breathing and thoughts counting exercises, the easiest way to get rid of a pestilent thought is to accept it. As long as I'm fighting with a thought, I'm never going to get rid of it. What I accept will cease to exist. It doesn't mean that I should use words and tell myself „OK, it's gonna be fine". I'm not saying anything, I'm not describing, I'm just accepting.

5) ACCEPTANCE AND POSITIVE TRAINING

Positive training is teaching by success. But what is the success? If we assume that every animal is different and that we have to see it and not our own goal, then the success is exceeding limits of that particular animal. But the performance of one animal will be much different from other animal. To recognise the success is to mark it in training, I have to recognise and accept limits of the animal before me. Only then I'll be training the animal, leading it along the way and not testing „if it's good enough". It's about the acceptance again, same as earlier.

6) WHISPERERS

Attractive image of the „spiritual style" of animal training is the so called whisperer, who can connect with the animal, sneak in his own thoughts and by this, he's able to control him. This image requires a human trainer on one side, who is „undoubtfully perfect and doesn't have to change a thing about himself" and imperfect animal on the other side, on which the whisperer overrules it somehow. In such a process the human wouldn't change, because he doesn't make any mistakes, but the animal would be changed, because the human wishes it so. I think that such a concept on connection is silly and mirrors human vanity. The animal

doesn't have a need to change and neither does it need to let the whisperer sneak into his head. What I think has a good chance for success is to CALM MYSELF, ACCEPT THE ANIMAL AS IT IS AND MAKE A ROOM FOR IT INSTEAD OF „SNEAKING IN", AND LET THE ANIMAL DECIDE IF IT WISHES TO ACCEPT THE INVITATION.

(Note: It's not about any magic. But if I calm myself and accept the animal, I'll start to give the animal managable tasks. We will start to communicate with properly timed movements, body posture, distance etc… measurable things. There's no need to send any mysterious energy. I have started to behave in a manner so I'm more understandable and it accepted my invitation. That's enough.)

7) FOCUS

Notice, that when we do our exercises and we succeed in channeling our focus, it's not about not letting any thoughts into our mind, neither about effort. It's about relaxation and ability to let go of thoughts that I don't need. Than I have the capacity to deal with things I should be dealing with instead of defending myself from things I should not be concerned with.

8) GUIDANCE

With our games, you have probably noticed that the best guidance is to not set up as a fight and impose your own will. The games, where each participant had other goals and tried to beat his partner to it with his/her personal force (will or physical), were not very successful and enjoyable for us. Basically, there was one condition from the last meeting missing – we saw our goal instead of our partner, and that is why we did not meet at the end. If the goal was not exactly set and the pair was aware of each other, the exercise became a search for the common goal. The partner, who was leading at the time, was more or less offering the way, and waiting to see whether the other accepts it. This is, in my opinion, is the ideal of correct guidance. ACCEPT the partner, as he/she is and OFFER an adequate common way and such proceeding, so that it is as acceptable for him as can be. Then, you will really get TOGETHER, where not only the leader, but also the guided one too. It fulfills the common interest. Simply said, DO NOT COMMAND, but OFFER.

9) CHANGING WORLDS AND RHYTHMS

To accept the other does not mean to lose ourselves. Every person has his/her own style, values, world… and even though the worlds of individuals vary, it is clear that an animal´s world differs even more from his trainer´s. By accepting my dog, I do not become a dog. I only manage to approach it as a better leader for him, offer him the way that I want to create for it in a better way.

In order to be satisfied with someone, whose world is not identical with mine, neither of us has to give up his world, nor we have to, with might and main, search for a middle compromise. With a dog, such compromise would be unpleasant for both parties, anyway. A better solution is to "take turns in worlds", respectively „pay each other a visit". In practice, this mainly means the change in the work rhythm. The animal has usually (not always) a quicker rhythm than the human. By rhythm, we mean the course of the training dialogue (I want work - stimulation-behavior-bridge-reward), respectively ABC of behavioral analysis (Antecedent (stimulation) – Behavior – Consequence, or even the inner dialogue Petra was describing (idea – emotion – action – result). Well, it is basically all the same thing, respectively different descriptions of one thing. If the training is led by human as the whole, the dog is forced to work in the human´s rhythm. The dog is basically forced to visit in the human´s world. That, in a way, is an exhausting thing and finally (even though it gets reward) inevitably has to lose motivation, because it cannot conform any longer. If the trainer´s pace and the dog´s pace alternate, you will soon find out, that both are interested in the exercise and rewards are only a secondary matter. In the first place, it is great to be yourself and have someone, who is in it with us. These moments of the change of pace then become the moments of accepting the other party. They become the reward themselves. In these moments, the difference between positive and negative reinforcement disappears.

If there is anyone, who has not understood what I am talking about yet, try to remember the mo-

ments when you felt good as a child and wished your mum and dad were there (without comments, changes, just be present). Or how a huge reaction of the main character was caused by the famous movie quote "Bridget Jones, I like you, very much, just as you are!"

10) THINK OF THE ONE YOU ARE TRAINING

Around the third session the following change shows with the group – they start to give themselves natural tasks. These do not mean easier, the tasks are of the same difficulty all the time, often even more difficult. But they have their own logic for the ones who are learning them. That is to say, we stop trying what the trained subject "is able to cope with", respectively "what we are able to teach it". We start to make training pleasant and comprehensible for both parties. The trainer stops doing it for himself/herself, but for the pair „trainer and the animal". From this moment on, you are really together. And that is, in my opinion, more than any diploma on the wall.

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Presentations

Breaking Down Barriers: What Dog Trainers Can Learn from Zoo Animal Trainers

Anna Oblasser-Mirtl
AnimalTrainingCenter

Worldwide there are approximately 6 million dogs living in our homes, some of which do amazing things like guiding blind people or detecting mines. Dogs are without a doubt intelligent creatures that have great learning abilities and deserve force-free and respectful handling. Even though there has been an increase in positive reinforcement training in the dog training world, almost all medical and most husbandry procedures are done without giving the dog a choice. Very often they are forced into stressful and painful situations, which compromises the dog's welfare and can severely harm the individual human-dog relationship. Inspired by the training done with many zoo animals, we decided to train dogs to participate voluntarily in medical and husbandry procedures. We created a program utilizing a variety of easy-to-train cooperative behaviors that give dogs choices and control in scenarios where previously they had none. Our training has been very successful and is a great example, both of how different types of animal trainers can learn from each other regardless of what species they typically work with, and how this learning can significantly improve an animal's welfare.

Medical training has been established as a basic component of responsible zoo animal care. Even though dog training tends to evolve towards positive reinforcement techniques too, medical training is still an almost completey forgotten niche.

Dogs are capable of learning amazing behaviors. They can be trained to save the lives of humans through search and rescue training, serve as guide dogs for the blind, alert their owners of low blood sugar levels, and some owners even train their pet dogs to perform amazing dances. Even though dogs are such intelligent animals, very often they are tremendously stressed when it comes to veterinary visits or grooming scenarios. There is absolutely no reason to refrain from training dogs to participate in their own care.

Both zoo animals and companion animals have similar needs and can learn to cooperate in their own care, but there are some differences between training companion animals and exotics. While many zoo animals stay in their familiar environment during veterinary procedures, dogs are usually taken to the veterinarian, and therefore need to perform in a stressful environment. Zoo animals are trained by professionals who have a great understanding of animal behavior and training techniques, while companion animals are trained by their owners who are often not familiar with positive reinforcement training, including counter-conditioning, desensitization, or shaping techniques. On the other hand, most pets enjoy or at least tolerate to be pet and therefore they adjust to tactile stimulation faster than exotics, who are not domesticated.

The main goals of the AnimalTrainingCenter's husbandry training program for dogs are to provide a training program suitable and manageable for most pet owners. This automatically leads to healthy and well groomed dogs, who cooperate in their own care and feel understood.

Our training program is supported by three pillars: Respect, trust and training.

Pillar 1: Respect

Empowerment by giving the dog choices helps dogs to feel more confident. The "I am ready" signal or cooperation signal helps the trainer to understand when the dog is ready to cooperate. It gives the dog a very clear instrument to tell the trainer and the veterinarian if he will tolerate handling or treatments. Almost every behavior can be made into an "I am ready" signal by following simple

rules: As long as the dog holds the "I am ready" signal, treatment is continued and reinforcement is delivered. As soon as the dog backs off, treatment and reinforcement both stop. Commonly used "I am ready" signals are chin rest, stationing, paw in hand of trainer, cradle (laying inbetween the streched legs of the sitting trainer), and lying on the side, to name a few.

Pillar 2: Trust

Trust is an important component of husbandry training in dogs. Steve Martin's trust account applies to any species and can be very helpful to teach dog owners about relationships with their pets.

Canine Body Language

Another important factor is to understand, recognize, and respond to canine body language. While calming signals can occur occasionally, the full body of the dog must be observed throughout the training to stay within a comforting and fun level.

Fear

Many dog owners still believe that a dog's fear response will increase if they pet, calm, talk to, or stay close to their dogs. In fact, fear can not be reinforced and it can be extrememly helpful for the dog if a calm and confident human friend is nearby.

Honesty

While every painful procedure is announced right before pain occurs so the dog can get ready, it's also important to act fair-minded and honest during all medical training situations.

Pillar 3: Training

A mixture of classical and operant conditioning are applied. To ensure success in medical training, it's important to train all details and as similar as possible as needed in a real-life setting. This includes introducing scents like desinfecting alcohol, doing behaviors on tables, or having strangers assist in training sitations to prepare the dog for veterinary procedures. (It's helpful to use extraordinary treats for medical training.)

Puppy Training

All medical procedures will cause less stress for an adult dog if, as a puppy, they get socialized well to all neccessary situations within the first 12 weeks of his life. These situations include tactile on all body parts, grooming, veterinary exams, restraints, standing on a examination table, and many more. Exposure alone isn't good enough, every situation should be fun and positive experience for the puppy.

Management: Getting ready for vet and groomer

Dog owners as well as veterinarians can make various arrangements to create a positive experience for the dog at the vet. This can be done by avoiding long waiting times, dog-friendly waiting areas with limited eye contact to other dogs or cats, and antislip floors as well as antislip mats on the table. Other things that can help include limiting food before the exam and bringing great treats to the appointment, getting the dog used to certain procedures like being lifed up onto the examination table, training a conditioned relaxation response, and a number of visits without anything painful or fear-eliciting being done to the dog. When these steps are done a visit at the veterinarian can become a fairly relaxing event for owner, vets, and dogs.

Advantages to Tuning your Guitar (Fish)

Blake A. Schembri

Disney's The Seas with Nemo and Friends®

Training in an underwater environment has been a rewarding task. Giant shovelnose rays (Glaucostegus typus) have a life history of being bottom dwellers, therefore often making them less visual to guests and aquarists. To help overcome this in a 5.8 million gallon main environment at The Seas, we developed two separate training plans. The first plan was a targeting behavior to enhance the visibility of the animals to our guests. The second plan was a voluntary capture behavior, which guests were able to view, that helped make medical procedures less stressful for everyone involved, most importantly the animal. Underwater communication between trainers and competition in a mixed species setting were two of the biggest challenges. After overcoming those challenges and finding success with these training plans, we noticed that the guitarfish have been more confident swimming around our large environment and do not seem to have the same fearful behaviors. With these positive sessions, we have been able to build their confidence, in turn increasing their visibility to our guests, and enhance their health and husbandry by better managing their diets and accomplishing capture with ease.

Big Cats Inspiring Conservation by Demonstrating Natural Behaviors on Cue

Amy Schilz and Rachael Hahn

Cheyenne Mountain Zoo

Many zoos, Cheyenne Mountain Zoo (CMZ) included, have been doing animal demonstrations for years. At CMZ, keepers were challenged to take these interactions one step further and really stay true to our mission statement: connect guests with wildlife and wild places. We knew our animals were extraordinary; we saw their amazingness every day. We started challenging ourselves to think outside of the box and create opportunities for our guests to see our animals the way we do. CMZ began pushing the limits with what we refer to as "Natural Behavior Shows". During these shows, guests get to experience what it would be like to see our animals in the wild by training them to perform the behaviors they're built for and to show people what helps the animals to be successful within their natural environments. For our big cats, we have put behaviors like running, jumping, chuffing, hiding and "hunting" on cue. Our training is paired with exciting, educational dialogue which we hope inspires people to go home, take action, and save our felid friends. The goal of each show is not necessarily to fill guests' heads with tons of natural history facts, but instead to break down barriers and connect them with our animals. We want to give our guests new possibilities and opportunities to learn more about big cats. During this presentation, we will cover how we trained some of these innovative behaviors, how we put novel spins on classic behaviors, and show how you can do the same.

A Challenging Past With a Promising Future: Successful Management of African Great White Pelicans Through the Use of Operant Conditioning

Tiffany Burns, Heather Statz, and Brooke Bowersox; Clearwater Marine Aquarium

In 2012, to support the mission of the Clearwater Marine Aquarium (CMA), two African great white pelicans (Pelecanus onocrotalus) were provided with a permanent residence. Upon acquisition, it was evident that the pelicans would present us with a unique challenge. Commonly practiced classical conditioning techniques were initially ineffective due to the pelicans' diverse training history. The pelicans also appeared to have a history of aversion and avoidance behavior associated with the presence of trainers. In order to provide the highest quality of care for all resident animals our goal was to develop a trusting relationship that would allow us to successfully manage the pelicans through operant conditioning. In the span of 3 years the pelicans have made significant behavioral progress. The success of the program was due to the utilization of primary trainers, proper desensitization practices, positive reinforcement training, and significant interaction time. Some of the notable outcomes include established husbandry behaviors and exercise alternatives. By using the fundamentals of training one can break down even the biggest of barriers with any species to ensure their well-being in human care.

Aquariums and zoos across North America promote education and environmental awareness through animal interactions. In June of 2012, the Clearwater Marine Aquarium (CMA) acquired two 7-year-old great white pelicans (*Pelecanus onocrotalus*) and provided them with permanent residency. The pelicans, Ricky and Lucy, were hatched under human care. Prior to residing at CMA, both pelicans lived at a facility in California with a focus on training for the film industry. They had roles in motion pictures including *Dolphin Tale* and *You Don't Mess with the Zohan*. Many challenging situations were faced upon the pelicans' arrival. Initially, classical and operant conditioning techniques were proving to be ineffective due to a number of variables. It was clear that the context shift from their previous facility to CMA had an effect on their behavior. There was an immediate aversion associated with trainers entering the habitat, which worsened due to the need of daily restraint and medical treatment. The issues were apparent and needed to be resolved to provide the best quality of life for Ricky and Lucy. The training team had to develop a plan to establish the fundamentals of animal care. CMA defined the fundamentals of animal care as being medically stable, providing a suitable environment, building positive relationships, and training through classical and operant conditioning. Through application of these four fundamentals, the training team was able to teach foundation behaviors and slowly increase the pelicans' repertoire. As the interaction time spent with the pelicans increased, their behavioral progression grew in unison. In the past 4 years, significant progress was made in the proper care and training while still managing to overcome continuous challenges. It became clear that regardless of the issues experienced, the proper use of relationship building and operant conditioning would be needed to break down even the biggest of barriers.

According to the Merriam-Webster Dictionary by definition, fundamental means "forming or relating to the most important part of something". The fundamentals of animal care recognized at CMA are medical stability, a suitable environment, having positive relationships, and training through classical and operant conditioning. When providing care for animals, medical stability is of the utmost importance. Trainers and veterinarians work side by side to establish medical stability and create a medical baseline for individual animals. A medical baseline is important because it can help trainers distinguish between behavioral indif-

ference versus medical non-compliance. The environment in which an animal lives directly corresponds to their overall well-being. Their habitat must be suitable for their individual needs, as well as complying with components of their natural history. In their environment it is imperative to encourage natural and baseline behavior. A trainer will begin to understand baseline behavior from an individual animal based on establishing a relationship and getting to know the individual animal. There must be mutual trust between both parties, which can be built upon. Relationship is the foundation for training and in order to successfully manage animals, both must exist. When Ricky and Lucy arrived to CMA, the training staff immediately began establishing these fundamentals.

The training team prioritized medical stability as the first fundamental. Upon arrival, the veterinarian team conducted physical examinations on both Ricky and Lucy and discovered severe cases of bumblefoot. Bumblefoot is a general term used to describe inflammatory or degenerative conditions located on the feet of birds or rodents (Cooper, 2002). Once this condition was diagnosed by the veterinarian of record, the training team was instructed on the treatment process. Due to the severity of the bumblefoot, active restraints were required on a daily basis to apply treatment. As the condition improved during treatment, the restraints lessened to weekly and eventually monthly in occurrence. In addition to applying the treatments, several substrates and perching materials were used to promote healing.

As part of the treatment process, it was imperative that the current substrate in the pelican habitat was changed. However, both of the birds' behavior already showed adverse reactions and loss of previously learned behaviors due to context shift. The substrate and perching materials were changed multiple times in order to promote healing of the pelicans' feet. These changes included sand, pebbles, and various soft mats. Each change of the materials took several days to weeks before the birds would be completely comfortable moving within their altered environment. In addition to this, there was a severe anxiety response associated with a variety of items besides the new substrates, such as cleaning tools and trainers. Ricky and Lucy would fly to the opposite end of the habitat, sometimes making contact with windows and aggressing toward trainers. After multiple substrate and perch changes were made, it was determined that the best flooring and perch covering option was Enkamat. Enkamat is still used today and has proven to be effective in improving the care of their feet and overall habitat cleanliness. The physical attributes of the habitat were established, but the use of training techniques and relationship building would be needed to resolve any remaining discomfort.

In the first 6 months of residence at CMA, the negative experiences with trainers outweighed the positive experiences. This had to happen to ensure medical stability and to establish a suitable environment. Once these were established, building a positive relationship became the focus. It is common practice to hand rear birds to develop these relationships from the start, however, Ricky and Lucy came under CMA's care at 7-years-old. To expedite the relationship process, the training team was reduced to a small group of primary trainers allowing the relationships to cultivate at a faster pace. Medical treatment was needed less frequently allowing for a longer recovery period between each restraint thus decreasing the negative experiences. The primary trainers were able to use training techniques to encourage comfort and relationship growth.

Training occurs in conjunction with relationship building on an everyday basis between animal and trainer. Due to the lack of trust between the pelicans and trainers, the training team began to build a positive relationship through conducting free feeding sessions. To regain trust, it was determined that the most effective method was to approximate the birds approaching the trainers. After several sessions of focusing on this the birds began moving towards the trainers at a faster pace. By using positive reinforcement the pelicans were conditioned to approach the training session immediately and allow trainers to approach them. Next, a bridge stimulus was introduced using classical conditioning while simultaneously desensitizing cleaning tools. Desensitization of novel objects and relationship building was an ongoing process in addition to the introduction of foundation behaviors through operant conditioning. The first behaviors trained were stationing and kenneling. Both birds quickly learned to station on perches, however, kenneling required a significant amount of time. Lucy moved through the steps of kennel training at a faster pace than Ricky,

which was the first indicator of a split path for the birds. As a result of the successful kennel behavior with Lucy, she began traveling around the aquarium to further her training, which included flight behavior for exercise and guest programs for public education. This advanced training lead to an increased amount of time spent with trainers for Lucy. It was during this time that the staff saw significant notable changes in the relationship between Lucy and the trainers. During non-contingent sessions she began to prefer being near and eventually became comfortable with receiving tactile reinforcement. Recognizing these changes in Lucy, it became clear that the relationship between bird and trainer would play a major role in the overall success of the pelicans.

A new concept introduced at CMA with the resident animals was a quantified goal of interaction time per day. The purpose of increased interaction time is manifold; one of which is to provide quality interactions between trainers and animals. Interaction time is comprised of a variety of contingent and non-contingent sessions. During non-contingent sessions, the animals are exposed to a variety of experiences depending on the individual. These range from simply being present in their environment to habitat maintenance to active play. It became evident that an increase in non-contingent time correlated to stronger relationships which lead to more successful training sessions. Prior to setting a specific goal for interaction time, on average trainers spent approximately 1 hour per day. This hour was typically comprised of contingent training sessions and habitat maintenance. When the quantifiable goal was implemented, trainers spent a minimum of 1 ½ hours per day with both birds. This increased time was composed of more non-contingent sessions. While this goal was being met, Lucy was inadvertently exceeding this goal due to flight training. When spending time in the pelicans' habitat, it was observed that there was a clear difference in behavior between the birds. Lucy tended to be in closer proximity to the trainers, whereas, Ricky remained at a further distance. Lucy began to walk through guests alongside trainers and travel regularly outside of the habitat to participate in guest interaction programs. As Lucy progressed quickly, Ricky continued to advance in training but at a slower pace. The training team was also able to implement a team contingent guest interaction program within the habitat. Together with the successes of training and increased interaction time the entire training team, composed of 12 individuals, was reintroduced into the pelicans' sessions.

As a result of the unexpected passing of Lucy in June of 2015, changes were made to Ricky's training plan. Due to the lack of social dynamic for Ricky, the training team increased the interaction time with him from 1 ½ to 3 hours per day. The goal for 3 hours of interaction time meant the focus on non-contingent time would be significantly higher than ever before. Both of these variables occurred simultaneously resulting in multiple noteworthy changes in behavior, the first being a stronger relationship with his trainers. A relationship was previously established with Ricky; however, a notable increase was seen in the development of trainer-bird relationship at this time. This was gauged by behaviors including recognition of trainers through the glass windows of his habitat, closer proximity during non-contingent sessions, and allowing tactile. The increase in comfort level with tactile allowed the ability to use it as secondary reinforcement. This milestone granted another level of variability during training. In less than a year, Ricky's repertoire strengthened to include: targets, stationing, kenneling, water sends, foot presents, A to B, trainer follow, and out of habitat interaction programs. Ricky has shown that he is now comfortable being transported to multiple areas of the aquarium where he will participate in both contingent and non-contingent training sessions.

Due to the positive reinforcement history of traveling to novel locations, Ricky was able to seamlessly relocate to a temporary habitat in February 2016 for renovations of his current habitat. The temporary habitat was unavailable to guests, yet provided a unique enrichment opportunity. During this renovation time, Ricky excelled at kenneling and transferring out of his temporary habitat multiple times a day for training sessions that included guest interaction programs in new locations. While in the temporary habitat he had access to a window for viewing of a resident common bottlenose dolphin (*Tursiops truncatus*) where cross species enrichment was comfortably conditioned. Introducing new environments and objects was previously a challenge for Ricky. During this time, his success in these scenarios indicated that the foundation built with relationship and training was effective.

Through the years at CMA, Ricky and Lucy made many behavioral strides at different paces. Upon

analysis it was determined that the behavioral progression of the pelicans was directly correlated to the amount of time spent with them. Lucy received more individual time with the trainers versus Ricky who received less individual time. This could have been offset by having a trainer present in habitat with Ricky while Lucy was taken out of their habitat for flight sessions. Since a typical flight session had a long duration it would have given the team a good opportunity to implement longer relate sessions with Ricky to help the continual growth of a positive relationship. The techniques of relationship building with Ricky were initially underestimated, which became clear when his interaction time changed to 3 hours per day. When evaluating the birds' interactions with their trainers it was determined the relationship directly benefited the training.

From 2012 to present, the difference in behavior is significant. In order to properly care for the pelicans the training team overcame many challenges. Medical issues presented the need to restrain the pelicans daily and change their environment, increasing the negative association already present with trainers. By building a trusting relationship through applying proper training techniques the adverse association that had developed was eliminated. Throughout this process techniques including desensitization, positive reinforcement, and increased interaction time proved to be effective. There was a direct correlation between increased interaction time with behavioral accomplishments, which can be used with a variety of species. With the success of a growing relationship, many training, education, and business goals were met. The progression through the years was an invaluable learning experience for pelicans and trainers alike. Although this process has taken a considerable amount of time, it has allowed Clearwater Marine Aquarium to provide the best quality of care for these animals. Using the fundamentals of animal care, one can break down even the biggest of barriers with any species to ensure their viability under human care.

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Transforming the Florida Aquarium's Animal Wellness Program through the Use of Positive Operant Conditioning

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The Florida Aquarium & Precision Behavior

In 2015, The Florida Aquarium enlisted the assistance of Precision Behavior to implement a holistic animal wellness program that added behavior management into the excellent animal nutrition, water quality, and veterinary care their animals already enjoyed. The aquariums "no animal left behind" commitment permeated all exhibits from mammals and birds to reptiles and fish. An extensive staff education program completely transformed the Aquarium's culture and the daily lives of their animals. Spotted eagle rays (Aetobatus narinari) now swim into their biologists' arms voluntarily for medically necessary fresh-water dips. Sand tiger sharks (Carcharias taurus), historically difficult to breed in captive environments, now participate in consortium-driven reproductive research facilitated by operant conditioning. Ring-tailed lemurs (Lemur catta) exercise on cue for improved physical fitness. A Goliath grouper (Epinephelus itajara) of almost 300pounds shimmies with delight as his biologists sprinkle sand on his body and release bubbles into his mouth as a reward for stationing and allowing body measurements. These are but a few of the dozens of examples of enhanced animal wellness due to the Aquarium's commitment to meeting both the physical and mental needs of the animals in their care. What's more, this intensive process has resulted in higher activity levels for the animals, an enthusiastic staff and ultimately, the opportunity to create meaningful experiences for our guests.

When Enrichment Isn't Helping: The Importance of Identifying the Function of Stereotypic Behaviors before Attempting to Modify Them

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The Buzz on Enrichment

It is estimated that over 80% of carnivores housed in zoological facilities worldwide display some form of abnormal behavior. With the publics rising concern for animal welfare and a simultaneous growing need to house rapidly declining animal populations, we have to better understand how to reduce abnormal behaviors in order to effectively increase those behaviors that are species-appropriate. Environmental enrichment will not always compete successfully with the reinforcement currently maintaining the abnormal behavior being displayed. Because the topography of stereotypical behaviors within a species often appear similar, they are often addressed comparatively with little success. By conducting a functional analysis, the caregiver is able to identify the function of the behavior, thus affording the ability to modify the environment so that the animal is no longer receiving the reinforcement maintaining the target behavior. Identifying the function of stereotypic behaviors prior to modifying them will increase the caregiver's efficacy in improving their charges welfare.

The welfare of animals housed in zoological institutions is not only of concern for zoo staff, but also the scientific community and general population (Mallapur & Chellam, 2002; Wells, 2009; Reade & Waran, 1996; Hosey, 2004; Miller, 2012). It has been demonstrated that animals' stereotypic behaviors is not only indicative of poor individual welfare, but also causes negative visitor perception. This outcome can drain an institution's already limited resources (Dorey, Rosales-Ruiz, Smith, & Lovelace, 2009). Identifying a more effective procedure for reducing and replacing abnormal behaviors is imperative if managers of captive wildlife populations are aiming to advance animal welfare standards at zoological facilities.

Stereotypic behaviors are demonstrated by animals in most zoological facilities (Mason, 2010; Mason et al., 2007; Bradshaw, Kelling, Bloomsmith, & Maple, 2007; Mallapur & Chellam, 2002). With increased concern for captive animal welfare, zoos are devoting considerable effort into decreasing abnormal behaviors and improving quality of life for animals in captivity (Wells, 2009; Reade & Waran, 1996; Swanagan, 2000; Hosey, 2004; Fernandez, Tamborski, Pickens, & Timberlake, 2009; Miller, 2012). Despite these efforts, current methods have little success in eliminating stereotypic behaviors in zoos (Lukas, 1999; Clubb & Mason, 2007). To date, the most common intervention to decrease stereotypic behaviors in zoos is by overlaying arbitrary reinforcement on top of existing reinforcements (Mace, 1994) through environmental enrichment (Hosy, 2005; Diez-Lion & Mason, 2016; Mallapur & Chellam, 2002). In doing so, the "why" of the target behavior is not identified prior to behavior modification, leaving any reduction in the target behavior to chance.

Comparatively, there is great success in reducing stereotypic behaviors in humans (Rapp, 2006; Boyd, McDonough, & Bodfish, 2012; Piazza, Adelinis, Hanley, Goh, & Delia, 2000). Arguably, the reason for the efficacy behavior analysts achieve in reducing stereotypic behaviors in humans lies in the utilization of a functional analysis prior to modifying a target behavior. By first identifying what contingencies are currently maintaining the problem behavior, behavior analysts are better able to develop an individual treatment plan to modify a target behavior (Dorey, Rosales-Ruis, Smith, & Lovelace, 2009; Hanley, Iwata, & McCord, 2003).

Zookeepers need to look at behavior on an individual level, rather than at the species as a whole. For example, a parrot participating in Self Injurious Behaviors (SIB) could be doing so for reasons that include the following: pain attenuation, attention from keepers, access to edibles, or escape from conspecifics. With such a myriad of possible functions, it is beneficial to first identify the maintaining reinforcer so that an effec-

tive intervention can be developed.

Currently, there is no accepted methodology for identifying operant functions of aberrant behavior in zoological facilities. Current zoological literature acknowledges that understanding the underlying cause of behavior is the best solution for decreasing stereotypic behaviors (Miller, 2012; Clubb & Mason, 2007). Literature also suggests manipulation of environmental variables in an attempt to isolate the function of a stereotypic behavior (Bradshaw, Kelling, Bloomsmith, & Maple, 2007; Hosey, 2005). Although stereotypic animal behavior should be successfully modified by applying the same techniques used to modify stereotypic behaviors in humans, these methods are not currently used in captive populations.

Definitions

Stereotypic Behavior

Stereotypic behaviors are commonplace occurrences at zoos worldwide dominating a multitude of species' individual behavioral repertoires (Mason, 2010; Mason et al., 2007; Bradshaw, Kelling, Bloomsmith, & Maple, 2007; Mallapur & Chellam, 2002) to the point of being considered 'statistically normal' in some captive populations (Lukas, 1999). A behavior is defined as a stereotypic when it fits the requisite form, which involves repetition, rigidity, and invariance, as well as a tendency to be inappropriate in nature (Turner, 1999). Behaviors are labeled as stereotypic based on topographical similarities meeting the criteria of physical and observable forms (Cunningham & Schriebman, 2008) meaning this umbrella classification often leads to identical treatment plans for behaviors that present similarly without first identifying the function of the targeted behavior (Clubb & Mason, 2007; Diez-Lion & Mason, 2016; Miller, 2012; Lukas, 1999; Hosey, 2004).

Environmental enrichment

The importance of environmental enrichment in zoos was first published in the 1920's by Robert Yerkes stating "The greatest possibility for improvement in our provision for captive primates lies with the invention and installation of apparatus, which can be used for play or work" (cited in Shepherson, Mellen & Hutchins, 1998). Since then, zoos have utilized it as the most common method for attempting to modify abnormal behaviors (Clubb & Mason, 2007; Diez-Lion & Mason, 2016; Miller, 2012; Lukas, 1999; Hosey, 2004; Newberry, 1995). There are numerous and varied definitions of enrichment. The Association of Zoos and Aquariums (AZA) Behavior Scientific Advisory Group defines environmental enrichment as: "A process for improving or enhancing zoo animal environments and care within the context of their inhabitant's behavioral biology and natural history. It is a dynamic process in which changes to structures and husbandry practices are made with the goal of increasing behavioral choices to animals and drawing out their species' appropriate behaviors and abilities, thus enhancing animal welfare (1999 AZA Behavior Scientific Advisory Group). A simpler definition of enrichment is "an improvement in the biological functioning of captive animals resulting from modifications to their environment (Newberry, 1995)." Sambrook & Buchanan-Smith (1997) stress the importance of allowing animals to possess control over their environment. Perhaps one of the most important characteristics of enrichment is decreasing abnormal behaviors in captive animal populations (Young, 2003; Wells, 2009; Laule, 1998).

Applied Behavior Analysis

Applied Behavior Analysis (ABA) is concerned with improving socially significant behavior and scientifically identifying variables responsible for behavior change (Cooper, 2007). According to the Behavior Analyst Certification Board, when behavior analysts are performing a behavior reduction program, they must first identify the function of the behavior (Professional and Ethical Compliance, 2014). The field of ABA is best-known in zoos for the positive reinforcement training methods used in protected contact settings.

Functional Analysis

Functional analysis methodology (FA) is a powerful experimental tool for identifying contingencies that maintain a wide range of behavior disorders and for developing effective treatment programs (Iwata et al., 2000). The most precise methods for identifying behavioral function are derived from procedures that are commonly used in applied behavior analysis. They are characterized by objective measures of ongoing

behavior taken under multiple test and control conditions, in which antecedent and consequent events are clearly prescribed and are arranged in such a way as to identify functional relations between environment and behavior (Iwata et al, 2000). It refers to any empirical demonstration of a cause-effect relation (Bear, Wolf, & Risley, 1968). This means ongoing behaviors are being reinforced. By conducting a functional analysis prior to attempting treatment, caregivers are able to identify the current maintaining function in an attempt to reduce or eliminate competing reinforcements. The sole intent for conducting a functional analysis is to "determine which sources of reinforcement account for problem behavior on an individual basis (Iwata & Dozier, 2008)."

Discussion

A lack of variation in the topography of stereotypic behaviors in captive animals often leads to zoological literature addressing the function of a behavior for an entire species, rather than the individual (Morgan & Tromborg, 2007). Performing a functional analysis allows the focus to be placed on the individual and a single target behavior being displayed. This allows the behavior analyst to accurately identify the reinforcer maintaining a behavior (Rincover, Newsom, & Carr 1979). Once the target behaviors function has been identified, an effective treatment plan can be implemented to modify the behavior.

The implementation of a functional analysis prior to behavior modification is regarded as best practice when working with humans (Iwata et al., 2000). Conducting a functional analysis on a stereotypic behavior requires the similar effort used to deliver environmental enrichment to the individual being observed. In fact, literature has demonstrated that students earing their bachelor degree can be trained to perform a functional analysis with at least 95% accuracy following a two-hour training session (Iwata et al., 2000). With a majority of AZA accredited facilities preferring a bachelor degree for zoo keeping positions, there is a suitable staff on hand capable of conducting functional analysis.

Though research on stereotypic behaviors is presently disjointed, there is potential for disparate fields to communicate openly about similar research subjects (Lukas, 1999). The Association for Behavior Analysis International (ABAI) has an active special interest group for Applied Animal Behavior. The Animal Behavior Management Alliance (ABMA) is a nonprofit organization whose core values include the use of "Science-based methods of assessment (What is ABMA?)." Correspondingly, the AZA has a Behavior Scientific Advisory Group whose mission is to "promote positive welfare and science-based approaches to animal training, enrichment, and behavior based husbandry programs (Behavior)."

Performing functional analysis on animals is not common practice despite the fact that there is at least one peer-reviewed example of its efficacy in a zoological facility. A study published in the Journal of Applied Behavior Analysis performed a functional analysis on a 13-year-old female Olive Baboon who displayed Self-Injurious Behaviors (SIB). The target behaviors identified were hair pulling, hand biting and foot biting. The functional analysis identified that the SIB was being maintained by positive reinforcement, through the delivery of contingent attention (Dorey, Rozales-Ruiz, Smith, & Lovelace, 2009). By identifying the function of her SIB, caregivers were able to modify their behaviors around her, which can in turn decrease the frequency or eliminate it completely.

Although the functional analysis is the most precise method for identifying the function of a behavior (Iwata et al., 2000), it comes with challenges. Animal care staff must be trained in how to properly perform the functional analysis, taking valuable time out of their schedule. A professional skilled with ABA should be available for consultation regarding results and possible interventions. Staff will need to devote additional time into observation in order to identify the function of stereotypic behaviors. One possible solution to these problems is the utilization of volunteers.

Identifying the function of stereotypic behaviors, through the use of ABA procedures, results in efficiently reducing or eliminating abnormal behaviors. The reduction of stereotypic behaviors in zoos will allow animal caretakers to advance animal welfare standards in zoological facilities. Due to the potential benefits to individual animal welfare in captive populations, the FA should be considered an important tool for animal behavior modification in zoos.

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Just Hold Still!
Voluntary Injection Training of Asian Small-Clawed Otters

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Training animals to participate in medical care, commonly referred to as husbandry training, is increasingly replacing involuntary restraint in the zoo community (Wagner, 2007). Although they are known for their high intelligence and trainability, (McKay 2008), the husbandry practices for Asian Small-Clawed Otters (Aonyx cinereus) commonly include restraint by netting and hand-grabbing (Andrews, Heap, & Wright, 2008). At Busch Gardens Tampa, 3.0 Asian Small-Clawed Otters were crate-trained for immobilization via inhalant anesthetic. This method, while less aversive than physical restraint, still presented issues. Sessions required multiple trainers and necessitated the crating of all three animals for separation. In addition, the anesthetic did not take effect immediately. As a result, crating became increasingly aversive, resulting in frustration, displaced aggression, and breakdown of the behavior. In December 2014, a plan was developed to train the otters for hand injection, as it was believed to be safer and less stressful for the otters (Keller, 2015). The goals of the plan included eliminating physical restraint, allowing injectable anesthesia to be used, and reducing risk of keeper injury by working in protected contact. The otters were trained to separate, enter a passive restraint tube, and were desensitized to a variety of touches. Ultimately, they were able to operate in a choice-based environment, learned to volunteer for their injections, and experienced safer, more efficient immobilizations.

Introduction

In February 2009, 3.0 Asian Small-Clawed Otters were transferred from Zoo Miami to Busch Gardens Tampa. In October 2014, the otters moved from their old habitat, which was being repurposed for African Penguins, to Jungala, the section of the park where the majority of the Asian species in the collection are housed.

The otters were primarily in a free-contact setting and interactions required a minimum of two people. The mitigation of any aggressive behavior was a high priority since the otters had a history of minor aggression, most notably during crate training. Crate training required a minimum of three people, and the otters were taught to enter the crates by baiting, a training technique in which food is used to maneuver an animal into a desired location. (Klappenback et al., 2004)

During their initial 5 years, all immobilizations were accomplished by inhalant anesthesia. To anesthetize the otters, each was individually crated and taken to the Animal Care Center (Busch Gardens' Veterinary Hospital), and immobilized there. The anesthetic took roughly 15-20 minutes to take effect. The otters spent roughly 25-30 minutes in the crate total. After being crated, they were separated from conspecifics, placed in a vehicle to be transported to the Animal Care Center where they experienced the effects of the anesthesia for 15-20 minutes until they became unconscious. As a result of this process, crating became aversive, and consequently, aggressive behavior was more common during these sessions.

Goals

Shortly after moving to Jungala, 7 year-old Ahgwey,1.0, needed to be treated for a root canal. Historically, netting, hand-grabbing, and other physical methods of restraint have been more common prior to husbandry procedures for Asian Small-Clawed Otters. (Mustelid Husbandry, 2015) Keepers and veterinarians agreed that injection training be utilized as a novel approach, as it was believed the induction was quicker

and less stressful.

It was decided that all three otters would be trained for hand injection. They would be trained to enter a tube open at both ends, providing them with the option of leaving at any time during the session. This would be in contrast to the crate, which had only one opening that could be closed off, causing the otter to potentially feel trapped.

In addition to the benefits listed above, it would provide an opportunity to shape a better perception of the crate without the potential need to force an unpleasant experience if a medical issue should arise. As a result, aggression during crate sessions would hopefully decrease, indicating a more positive association with the crate and a safer environment for trainers working these sessions.

Methods and Process

Materials and Set-Up

The otters shared a habitat and house with 1.1 White-Cheeked Gibbons (*Nomascus leucogenys*), so their indoor bedrooms were "gibbon-proof," with 1"x 1" mesh as the walls. The "injection tube" would be secured to the side of the bedroom. A 6" PVC pipe was cut in half along its long axis to be used as the "injection tube." Along each side three small holes were drilled and zip-ties were used to secure the tube to the mesh. The bottom half of the tube was pulled flush with the mesh, while the top half was left much looser so that it could be tightened according to the size of the otters. One of the larger otters was trained first to allow the tube to be tightened until it was the ideal width, which was roughly 8" from the mesh to the furthest point of the tube. The otters and gibbons were observed during their initial interactions with the tube to ensure they would not attempt to chew on or get caught in the zip-ties. The tube was hung roughly 1' off of the ground to mitigate additional movement while in the tube. The otters would be trained for injections in protected contact for trainer safety.

In addition, the otters were conditioned to a whistle bridge. A bridging stimulus is used to indicate the instant at which an animal completes a desired approximation or behavior. (Klappenback et al., 2004) Prior to moving to Jungala, the otters were not conditioned to a bridge. A whistle was chosen as mechanical bridges have been demonstrated to improve efficacy of learning. (Pryor, 2009) An LRS, also known as a least reinforcing scenario, is a 2-3 second pause where reinforcement would typically be delivered if the response was correct.

An LRS also acts a stimulus for the animal to return to a calm, attentive state. (Klappenback et al., 2004) Because of its function as a stimulus, all otters had been trained to return to the trainer and remain calm when the trainer offered this neutral response.

Separations

The otters were conditioned to separate in order for one trainer to work with multiple otters. The otters had a tendency to "line up" for their feeds next to each other in the same order, so this order was reinforced. If the otters "scrambled" or changed the order, reinforcement was withheld until they rearranged themselves. Because of their natural tendency to organize themselves, they had no issue learning to maintain this order.

Each otter was paired with a differently colored disc that he was trained to station both on (by standing with two front paws on it) and at (by sitting in front of it while it was clipped to the mesh). The otters had also been conditioned to their names.

The gibbon house in Jungala has two large bedrooms for the gibbons with one room having an adjacent "otter holding" bedroom. A small slide shift door connects a one of the large rooms with the otter holding. This allowed the otters to essentially line up while being in different rooms. The disc stations were hung on the mesh with two on the "otter holding" side and one on the "bedroom" side, where the training sessions took place. The door was opened and the otters were reinforced for sitting in front of their appropriate stations. If an otter was not at the correct station, he was simply not reinforced. The otters quickly caught onto the behavior, and eventually reinforcement for separation became minimal.

Tube Training

The otters had all been learning to touch and follow a target pole with their nose. Javin and Puba, 2.0, were proficient enough at the behavior to utilize targeting in learning to enter the passive restraint (PR) tube. The otters were targeted first near the outside of the tube, and then gradually targeted further and further into the tube until their full body (minus tail) was comfortably inside. Ahgwey was not proficient enough at targeting to use this approach, so a combination of luring and shaping was utilized.

Fading is a procedure for gradually changing a stimulus controlling an organism's performance from one stimulus to another. (Klappenback et al., 2004) Once the otters were consistently entering the tube in the correct position, the targets were faded to just a pointed finger. The verbal cue "tube" was added as well. During this step, the otters were bridged for running and jumping up to get into the tube in response to the verbal cue. Gradually, the full behavior was required.

To develop a positive reinforcement history, the otters were always given primary reinforcement in the tube. If they happened to exit the tube before being reinforced, the otter was asked for the behavior again and reinforced inside of the tube.

Once the otters were comfortable inside of the tube, increased duration was added to the behavior. The initial step was a less-than-one-second "pause" in the tube, gradually working up to 10 seconds. Increments were generally 1 second increases. Care was taken not to always make the behavior "harder" by making each interval longer and longer. A typical increase looked something like this: Bridge for 5 seconds in the tube, then bridge for 2 seconds in the tube, bridge for 4 seconds in the tube, bridge for entering the tube, bridge for 6 seconds, bridge for 3 seconds, bridge for 7 seconds, etc.

To mitigate "self-release," the otters were cued to exit the tube with a target. The goal was that the otters would expect to remain in the tube until given a target. To reinforce this idea, the otters were variably reinforced in the tube, sometimes receiving only one piece of reinforcement, and sometimes multiple. The otters were also conditioned to expect that reinforcement could be "spread out," where fish would be given a second or two apart, as opposed to receiving all of the pieces at once.

Desensitization to Injections

Desensitization is defined as the process of using time or experience to change an animal's perception of a stimulus to neutral or no value, where active desensitization utilizes primary reinforcement. (Klappenback et al., 2004) Once the otters were comfortably sitting in the tube for up to 10 seconds, desensitization to touching of the haunch area began. The very first step was to desense the otters to hand movements. Any movement of the hand prompted a reaction from the otters in the form of backing up to the hand in anticipation of being handed reinforcement or exiting in anticipation of a hand target. Small movements were used at first, gradually working up to touching the otter's hip. Increased pressure was also used, as was duration. Once the otters were comfortable with this, the other objects were incorporated. The objects were always in plain sight of the otter. The otters were initially touched with just the trainer's finger, then worked with other objects such as a Q-tip, a capped syringe, a flushing syringe, and a blunted needle.

Troubleshooting

Each otter encountered his own speed bumps during this training process. The majority were displays of discomfort that simply necessitated going back and working on the reinforcement history of a particular component of the behavior.

Javin

Because he used the mesh to climb up into the tube, Javin's initial layout in the tube was on his side. This also allowed him the traction to quickly back out of the tube when he was uncomfortable. In the initial stages of the behavior, he demonstrated discomfort by frequently backing out of the tube. These responses were given an LRS and the behavior was restarted. To address the laying out behavior, the tube was first checked to ensure it didn't need to be adjusted for him to fit comfortably. As reinforcement history was built in the tube, he would occasionally run into the tube in the correct sternal position. These responses were captured and he was given a magnitude reinforcer each time he assumed the position. For as long as he remained sternal, he was fed in position. Gradually, the frequency of offering this position increased, and the

incorrect side layout was not reinforced.

Once he began to be desensitized to increased finger pressure, he began to climb into the tube and offer his "side layout" again. Since this behavior had appeared to be extinguished for such a long time, it seemed to be an indicator of discomfort with the current approximation. To address this issue, the criterion was relaxed to roughly half of the pressure that elicited the "side layout," and the sternal layout quickly reappeared. Once he consistently offered the correct position, the finger pressure was increased again and he easily mastered that approximation. He offered the side layout once again when the blunted needle was introduced, and a similar approach (relaxed pressure) was used with the same successful result.

Puba

Puba also learned to enter the tube by crawling sideways along the mesh. In the initial stages of training, he was very reluctant to enter the tube from his hips downward. Similar to Javin, he would frequently express discomfort by backing out of the tube and it was believed that the reluctance to fully enter the tube could be attributed to the same cause. Simply asking for extended targets that he had to reach towards was producing only limited results. However, once the trainer changed position to being closer to the exit of the tube, where the otter would be moving towards the trainer, progress came more quickly. Pairing the change in trainer position with slightly extended targets (each just a few extra centimeters in front of the nose) quickly yielded a full entry into the tube.

While these changes resulted in Puba fully entering the tube, his position mimicked Javin's sideways layout. It was addressed in the same way as Javin's was and the side layout was eventually eliminated.

Ahgwey

Ahgwey, as mentioned above, could not be trained to enter the tube using only targeting. Because he was not proficient in the target pole behavior, he was lured with primary reinforcement into position. Once he repeated a position once or twice, the lure was faded and he quickly learned to offer the correct position. Ahgwey did not run into the same issues as the other two otters, likely as a result of his smaller size.

Conclusion

The goal of training this behavior was to, first and foremost, allow for a safer and less stressful way to immobilize the otters. This goal was certainly accomplished, but upon looking back at the data and discussing immobilization with other otter keepers, some important points began to surface. One of the most commonly cited reasons for a lack of training in any zoo is a lack of time (Pratte, 2016). As mentioned before, it is not uncommon for Asian Small-Clawed Otters to be physically restrained, possibly due to their smaller size in comparison to other otter species. (Andrews, Heap, & Wright, 2008) Another contributing factor to this trend may be the fact that this particular species is the one of the most social, with many social groups having up to 12 individuals. (Perth Zoo, 2011) This species is also known for exceptional excitability during feeding. (Pellis, 1991) For all of these reasons, it is easy to see why physical restraint might seem easier and less time consuming than training each animal to perform the behavior.

Javin, Puba, and Ahgwey each received at least one training session daily, 5 days per week. Injection sessions were held at least once a week, while interspersed with other behaviors to prevent boredom with the behavior. Almost all injection training sessions were recorded, which allowed for session length per animal to be recorded. Each group of three sessions (for all three animals), from set-up to cleaning dishes and recording session data, took roughly 10 minutes. Separations took, on average, 15 seconds. Otters have a notoriously short attention span, so care was taken to keep sessions short, positive, and successful. Before beginning duration training, injection sessions were averaging only about 30 seconds per otter. Once duration training began, injection sessions were roughly 1 minute 15 seconds. After compiling all of the video, it was revealed that each otter learned the injection behavior in roughly 20 minutes. It took approximately one hour to teach three otters to sit still for hand injections.

The intelligence of otters, especially Asian Small-Clawed Otters, has been demonstrated repeatedly by their problem-solving ability, destructiveness, and popularity in shows. (Maple, Perdue, & Snyder, 2013) The results of this behavior plan proved that multiple animals can be trained by one trainer in very little time

to safely participate by choice in an important aspect of their health care. In her attempt to collect data on the welfare of captive Asian Small-Clawed Otters, Lesley Wright stated that keeper anecdotes and job knowledge were the some of the most valuable tools when attempting to assess animal welfare. (Wright, 2003) While the goal of this particular training plan was to specifically enhance the welfare of Javin, Puba, and Ahgwey, it is the goal of this paper to offer information that will enhance the welfare of other Asian Small-Clawed Otters.

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Replacing Self-Injurious Behavior of an African Elephant at the Zoo Knoxville

Rebecca Wyatt

Zoo Knoxville

This presentation will describe a case study of a 31 year old female African elephant at the Knoxville Zoo that began performing self-injurious behavior (SIB). Generally, her behavior can be characterized as energetic and inquisitive, and as with many elephants in human care, she performs some repetitive behavior throughout the day, e.g., swaying. In October of 2014, the elephant care staff observed that she had developed a SIB of positioning her foot on exhibit holdings and furniture and scraping her tusks across the wrists and nails of the front feet. The staff labeled this behavior "tusking." The focused intensity of the tusking behavior was producing significant wounds and compromising her overall welfare.

In December 2015, with the assistance of a behavior analyst consulting with the team, we conducted a functional assessment of the behavior to identify the most probable times of day and conditions that the SIB would likely occur and the possible consequences produced by the SIB that gives it function. The results of this preliminary assessment were suggestive of changes in the setting and management of this elephant, which led to a systematic, daily approach where the staff has implemented action items and an activity study to further benefit all of the elephants under our care. The SIB has been significantly reduced by the package solution we have implemented. The details of the struggles and paths to success will be explored further in this paper.

Innovative Enrichment: We Never Met Hal Markowitz... But We Sure Wish We Had!

Mark Kingston Jones and Chris Hales

The Shape of Enrichment and

Team Building, with BITE

Across the zoo world there are countless examples of great enrichment ideas, which have remained prototypes despite being partially or wholly successful in meeting their behavioural goals for the animals using them! Since the 80's, innovative designs, such as those by Hal Markowitz's behavioural engineering, have provided access to fantastic inspiration that seems to have rarely led to concepts being rolled out across the captive world. Instead they have remained little gems, hidden and only accessible to those in the know. Issues with technologically complicated designs and initial expense of prototyping, limit our designs and imagination. Problems with budget and design experience can be overcome with collaborations outside of the zoo world however, and with the modern zoo being rightly concerned with increasing the visitor experience and engagement, what better way to achieve this. A lot of the best enrichment ideas we have seen have come from people taking an idea, building and developing on it. With the conference theme of 'Breaking Down Barriers' we would therefore like to take this opportunity to remind people of a couple of those lost gems, and put forward a portfolio of new, untried and untested ideas. These ideas aim to meet goal directed behaviour, increasing animal welfare while enhancing the visitor experience from witnessing these behaviours. The aim is that these ideas might be taken forward, refined, improved and incorporated into new enclosure designs and refurbishments.

Charging Ahead in Rhino Welfare: Iron Overload Disorder Management in Black Rhinoceros

Melissa Solomon and Malisa Hammell

Disney's Animal Kingdom

It has been shown that browsing rhinoceros species held under human care, unlike their wild counterparts, store excessive amounts of iron in their liver and tissues. Iron accumulates in correlation with time in captivity and can lead to a cascade of other disease processes. At Disney's Animal Kingdom, we have been actively managing our black rhinoceros population to mitigate the effects of iron accumulation through a multifaceted iron overload disorder management program. One key component of this approach has been the implementation of a Large Volume Phlebotomy training program. This presentation will provide a brief history of the program; highlight the improvements we have made in the 7 years since its inception, and offer evidence of the role of LVP in successfully advancing the welfare of captive black rhinoceros. Attention will also be paid to the incorporation of new personnel to facilitate long term sustainability of such a unique and large scale behavioral management program.

Black rhinoceros (*Diceros bicornis*) were once the most abundant of the five remaining species of rhinoceros on earth (Emslie, 2012). Their horns are the target of intense poaching to supply a demand rooted in the inaccurate belief that their horn has medicinal qualities. Since 2007, rhinoceros poaching in South Africa alone has risen 9,000%, with over 1,200 total rhinoceros killed in 2014 (IRF, 2016). The total population is considered critically endangered and estimated at approximately 5,055 individuals (IRF, 2014). With the current state of the poaching epidemic, sustainability of captive populations is imperative in the effort to conserve the species.

While zoo management of a population provides necessary protection from the threat of poaching, the decision to remove species from their natural habitat can result in other risk factors that can be detrimental. An example is that black rhinoceros develop Iron Overload Disorder (IOD) outside of their natural environment (Paglia & Tsu, 2012). By adopting a multi-faceted management program at Disney's Animal Kingdom, we have been able to address this serious disorder. Though all aspects of this program play an integral role in managing the disorder, this paper will focus on the process of developing and implementing a voluntary large volume phlebotomy (LVP) training program in the black rhinoceros at Disney's Animal Kingdom. Successes, challenges, and methods for program implementation and sustainability will be discussed.

Iron Overload Disorder Overview

In order to understand the need for this treatment approach, an overview of the disorder must be explained. A variety of mammal and bird species have been shown to exhibit IOD in a managed environment including tapirs, fruit bats, lemurs, dolphins, mynahs, some rodents and lagomorphs, and occasional carnivores (Clauss & Paglia, 2012). Browsing species of rhinoceros are two of the many species thought to be greatly affected by this disorder. IOD is the result of a dysregulation of iron leading to excessive and uncontrolled accumulation of iron. This in turn creates free radical production, organ damage, and toxic body environments. Accumulation of iron leads to a toxic buildup in the body (Ganz & Nemeth, 2012). Secondary diseases possibly related to IOD include hemolytic anemia, hepatopathy, and ulcerative dermatopathy (Dennis et al, 2007). Paglia & Tsu (2012) report that hemolytic anemia and other diseases linked to IOD are a leading cause of death in the zoo population of black rhinoceros. For this reason, this disorder must be properly monitored and addressed.

At Disney's Animal Kingdom, there are three main components to the management program. Blood values that serve as iron level indicators are monitored on a regular basis through voluntary blood collection. The diet for the collection of black rhinoceros is carefully selected to minimize iron content and utilize natural iron binding components like fresh browse. The final component is LVP.

LVP is the use of venipuncture to remove large volumes of blood from an individual. Large volume is defined as at least 3 liters. This method is a commonly used therapy for IOD in humans. The removal of large quantities of blood "tricks" the body into thinking it is in an anemic state, which then causes the liver to release iron to produce red blood cells. The iron released into the bloodstream can then be removed in future LVP. It had been proposed that this approach could prove to be useful in the treatment of IOD in rhinoceros. This method was adopted at Disney's Animal Kingdom as a method of addressing IOD in black rhinoceros.

IOD management through routine monitoring of iron levels, a controlled dietary regimen, and regular LVP sessions has been shown to be effective in reducing and maintaining healthy iron levels in the collection (Mylniczenko et al, 2012).

History of Large Volume Phlebotomy Program Development

In July of 2002, the animal care team at Disney's Animal Kingdom began routinely collecting and analyzing blood samples for a dietary research project. This method of monitoring was integrated easily due to prior behaviors trained in the black rhinoceros collection. All of the animals were trained for routine blood sample collection from their front legs, as well as a variety of other behaviors that facilitated medical and husbandry procedures. This time period also coincided with the decline in health of one of the males in the collection. His condition continued to decline and the decision was made to humanely euthanize in May 2003. Upon necropsy, it was confirmed that this individual had IOD. This loss prompted a multi-faceted response from the veterinary, nutrition, and husbandry teams.

The response was to dramatically decrease the amount of dietary iron that the remaining animals were ingesting. The teams would also continue to monitor the animals for iron levels through routine voluntary blood collections. This approach continued until 2009 when keepers observed behavioral changes in another male, including lethargy and lack of interest in training sessions. There was a correlative spike in one of the indicator values and the decision was made to immobilize him to attempt an LVP. This animal had 10 liters of blood removed during this immobilization and his blood values and behavior were observed returning to a more normal level post-treatment.

This illustrated that LVP had the potential to be a useful tool in combating elevated iron levels. A growing body of peer-reviewed research on this disorder, and the continued death of rhinoceros in zoos from possibly related diseases prompted a rejuvenated effort to continue to seek improved management techniques for this species. It was decided over a series of meetings involving veterinary, nutrition, and husbandry staff that keepers would move forward to train voluntary LVP on the two animals that were most affected by this disorder.

Since the opening of Disney's Animal Kingdom, the keepers working with the black rhinoceros have maintained a strong and active training program. Many of the behaviors trained prior to LVP were useful when taking on this new challenge. These behaviors include: voluntary small volume blood collection from front legs, stepping left and right, foot adjustment, target, steady, back, head up, and use of the hydraulic chute. Both the animals and the trainers were set up for success for LVP training because of this strong history and partnership.

Descriptions of Voluntary LVP Procedures

Facilities and Equipment

Historically, most LVP training has occurred in a hydraulic chute system and has involved venipuncture in one of the two front legs. The procedure has also been safely conducted in a stall as well. Though the procedure can take place in a stall, the chute is considered to be the safest option to ensure that the animal will not be able to walk away with a larger gauge needle inserted in their leg.

It is important to note that while in the chute the animal is contained, not restrained. They are given some ability to move and adjust their body positioning, and the chute can be opened quickly should an issue

arise. The chute system at Disney's Animal Kingdom is adjustable and can be customized to the body shape and comfort level of each animal.

Medical equipment evaluation has been ongoing since the program's inception. The veterinary and husbandry teams have partnered and attempted a number of setups over the years but have settled on a current setup that works reliably. The recommended equipment is: cleaning solution (alcohol, Nolvasan, and/or dish soap and water), gauze, Gebauers Ethyl Chloride numbing spray, 18-20 gauge needle, 500-1000 mL evacuated container, Mila collection tubing with burette, and sample tubes. Total cost per session for the equipment is estimated to be $60.00 (USD).

Stall Based LVP

Stall based LVP occurs when an animal is lined up parallel to bollards that allow keepers safe access to the animal's front legs. The trainer cues the animal to line up left or right, depending on which is appropriate for the targeted stick site and holds the animal under stimulus control throughout the procedure. The veterinary technician will assess the stick site, clean with an alcohol pad, spray with the numbing spray, and stick the targeted vein. The stick site is on the inside of the far leg of the animal, relative to the position of the technician. This allows for a clear view of the anticipated stick site. Once the line is flowing reliably the technician monitors the line and changes out the filled evacuated containers as needed. The session is ended when either the goal volume is collected or the trainer feels the animal's compliance is declining.

Animals that have performed this behavior are trained for LVP blood collection on both front legs and can be asked to line up on either side to facilitate the collection. The reservation with this approach is that if the animal breaks stimulus control, they are able to walk away with a needle inserted. Ideal location for the LVP procedure is in a location that reduces the animal's ability to walk away from the trainer.

Single Leg Chute Based LVP

Single leg chute based LVP is when the animal is called into the containment chute and held under stimulus control for the duration of the session. The veterinary technician once again will assess, clean, spray, and stick the inside of the far leg, relative to the position of the technician. Once a reliable flow is established the technician will tend to the line as blood is collected and will change collection bottles as needed. This approach has yielded up to 4.6L and has lasted up to 60 minutes a session.

Double Leg Chute Based LVP

In an effort to increase the efficiency of LVP, a double leg approach was attempted and successfully implemented. The animal is called into the chute in the same manner as the single leg chute based LVP. Once the veterinary technician has established a reliable flow on the front leg location, a keeper takes over and tends the line and switches out collection bottles as needed. The technician will then relocate to the back end of the animal. The back leg stick site is on the closest leg, relative to the location of the veterinary technician. This has been found to facilitate the strongest blood flow during the double leg LVP. Once the back leg line is also flowing reliably, the technician continues to monitor that line and change out bottles as needed. This approach has yielded up to 4.5L and has lasted up to 30 minutes a session.

Human Resources for LVP

Regardless of the location of the LVP there are specific roles that the team has identified as important in facilitating a successful procedure. The trainer role is the leader for the procedure and makes decisions during the session based on the animal's responses and team member feedback. A veterinary technician is responsible for sticking the animal and necessary adjustments of needles and collection equipment during the LVP. An additional keeper serves as a "safety point", who oversees human and animal safety throughout the session. If the LVP is taking place in the chute, there is a keeper stationed on the hydraulic door controls. If the LVP is a double leg LVP, another keeper is required to tend to the front leg line.

Communication is key throughout this process and it is the responsibility of both the technicians and the trainers to communicate their movements, blood collection status, and behavioral responses of the rhinoceros to one another.

Program Sustainability: Overcoming Challenges and Strategies for Success

The time in which the large volume phlebotomy program has existed has not been without challenges and setbacks. Despite encountering a variety of hurdles to overcome, the long term benefits to the animals are worth the short term problem solving that is required to achieve sustainability with LVP.

Staffing

LVP is a procedure that requires multiple keepers and at least one veterinary technician. Perhaps the most important key to success is the support and "buy in" from a facility to pursue this relatively new venture into IOD management. Scheduling appropriate staff was difficult at first. The simple answer to this challenge is that LVP must be made a priority by those involved, as well as their leaders. As stated, this process has needed backing from the nutrition, veterinary, and husbandry teams from the beginning. All parties involved must lend their support and expertise in this process to continue to improve care for black rhinoceros. Top down support allows the team to prioritize this effort appropriately among the additional responsibilities of the animal care staff. The current time requirement for the LVP teams is approximately one hour a week. The session time and day is kept consistent to facilitate ease of scheduling for all team members involved.

Choosing the members of the team is not a random process. By strategically assessing your keeper team and filling specific roles that fit personal strengths, the process can be set up for long term success. The lead trainer role must be knowledgeable about the individual animal and the LVP process, be able to make quick and definitive decisions, and most of all be able to effectively communicate to the animal and their human teammates. Their ability to accurately read and interpret the animal and work them through more difficult sessions is paramount to the long term success of the behavior. Keepers who are performing the role of safety point or assisting the veterinary technicians should have a strong working knowledge of the equipment and the technical process of LVP, but must also have a strong ability to anticipate and interpret the response from the animal during the procedure. They are a second set of eyes on the body of the animal and must also be able to communicate well with their lead trainer and the veterinary technician.

Veterinary technicians must have a strong working relationship with the animal and keepers, which can be difficult if they are not regularly available. This was improved over time by having regularly scheduled sessions, some of which were focused simply on building and strengthening the relationship between the technician and the animal. This aspect can be easily overlooked because keepers typically have a strong familiarity with the animals they care for, but veterinary technicians can be visually associated with medical procedures that could have negative associations for the animal. This can be worked through with time, patience, and building a positive new relationship between all parties involved. It has been demonstrated that dedicating a particular veterinary technician per animal has been a successful approach.

Additional roles can include the hydraulic door operator, and other keepers who are observing or assisting. These roles are especially important to fill with keepers who may not have as much background or experience with training this behavior. Ensuring that less familiar keepers are being included facilitates the cycle of education and incorporation. This will lead to a more stable level of staff knowledge and experience over long periods of time, creating a sustainable program.

It is also important to note that the roles have not always been filled by the same keeper at every session. Certain animals have responded well to a single lead trainer, while others are adaptable enough to have multiple people who can fill that role in the session. The entire team should grow to work as a cohesive unit that knows their individual roles and can adapt if necessary.

Equipment

Equipment adjustment and failure was a major hurdle when LVP was being implemented. Almost every piece of equipment has been evaluated, tweaked, or overhauled due to challenges encountered during sessions. These challenges included inappropriate needle size, tubing collapses, ineffective connectors, and loss of suction in evacuated containers. The equipment challenges not only impact the efficacy of the LVP, but can also have a direct impact on the comfort level of the animal during the session. Utilizing a needle

that is too large or a line with too much suction can negatively impact the behavior of the animal. Through many years of testing and adjusting, the previously stated equipment list is one that has been found to be reliable in function, comfortable to the animal, and affordable.

Behavioral Setbacks

There have been a variety of situations over the course of the LVP program that have resulted in behavioral setbacks. The most important learning, no matter what the cause of the setback, is to remain patient and consistent when working to rebuild. Some encounters have taken months to build back to a reliable point. The focus of the rebuilding process should be behavior over volume. Though it can be frustrating to wait to get a large amount of blood, it is imperative that this be a solidly trained behavior that will ensure the long term ability to utilize voluntary LVP as a means to manage IOD.

The importance of the trainer and the team's ability to accurately read the animal cannot be overstated. Trainers must have a strong knowledge of the animal including typical signs of frustration, nervousness, discomfort, and be able to accurately interpret such behavior within the context of the LVP session. Quickly and accurately identifying the source of the behavioral concern allows for quicker and effective resolution. Though the specific circumstances are varied, some of the major setbacks and solutions tie directly to this skill.

Adjustment of the physical environment is one of easiest changes that can be made to increase the comfort level for the animal. Examples include: adjusting the width of the chute, adjusting shoulder bars to fit body length, or adding mats under their feet while standing for long periods of time. Some animals have also performed better during specific times of day. Being aware of their response to all of the environmental influences can facilitate a more successful session and strong behavioral compliance over time.

Reducing total chute time for the animal has typically yielded stronger behavior over time for animals that are more likely to show signs of anxiety or boredom when kept in the chute for longer time periods. One example is to clean the anticipated stick site in the barn before the LVP session begins. This was found to decrease chute time by approximately 5 minutes, which can allow additional time spent collecting blood on a compliant animal.

Trainers must also be careful to leverage reinforcement during the course of the session which can last up to 60 minutes. Knowledge of the individual animal's preference for specific food items can promote motivation and compliance during lengthier sessions.

The Future of LVP

Future goals for the LVP program include continuing to gather data for peer-reviewed publication on the effects of LVP and training and incorporating the other two animals in the collection. This will create a more robust body of research on IOD management and directly impact the health and welfare of the animals in the collection.

The larger future focus lies beyond the collection at Disney's Animal Kingdom to the entire ex-situ population that is susceptible to IOD. A tipping point has been reached and a sufficient body of evidence shows that we as a zoological community can and must address the issue of IOD in managed black rhinoceros. LVP is a tool that animal care professionals can effectively implement to manage a disorder that is implicated in the deaths of a significant portion of the captive black rhinoceros population. LVP is one piece of a larger and multi-faceted management strategy that can ensure the continued health and welfare of this species. As we continue to see poaching rates increase, the captive care of this iconic species becomes more critical by the day.

This paper was written with hope that others will take the experience and shared knowledge and continue to make a positive impact in the management practices for this critically endangered species. While this doesn't mean that LVP would be an expected management tool for every facility, it is the hope that all institutions that house black rhinoceros will be more aware of the disorder, more capable of monitoring their collections for IOD, and empowered to respond if their animals are affected.

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Improving Enrichment and Education in the Pet Shop Environment

Elizabeth Durkin

Dobbies Garden Centre

In 2015, there were an estimated 1 million pet rabbits, 0.7 million pet guinea pigs and 0.4 million pet hamsters in the United Kingdom. With the pet shop being the most popular place to purchase these pets, it is evident that pet shops have a fundamental role in educating pet owners on correct animal care, including leading by example. This education is of key significance, considering the rabbit is one of the most neglected pets in the United Kingdom. Beyond basic husbandry knowledge, enrichment is a key element to improving welfare, with opportunities to provide mental and physical stimulation. Dobbies Garden Centre has incorporated various shop-bought and recycled, handmade enrichment into daily husbandry, and uses these examples to educate pet owners on providing opportunities for their pets to perform natural behaviours. The introduction of objects including, treat balls, cardboard boxes, paper bags and cardboard tubes has shown to enrich the animals' lives in the shop, and this provides inspiration for pet owners. The use of enrichment has also shown to reduce "problem behaviours" by encouraging animals to perform natural behaviours, such as foraging. Additionally, enrichment encourages pet owners and children to play a more active role in improving the welfare of their pet, and enjoy their pet more, due to increased activity. Enrichment ideas are continually expanding, and practices are being adopted and reinforced by all members of the team, to ensure welfare is prioritised and maintained in animals beyond the pet shop.

Introduction

The Pet Food Manufacturer's Association (2015) annual report indicates that there are over 1 million rabbits kept as pets in households across the United Kingdom. This figure has remained relatively constant over the past 6 years, declining from 1.3 million in 2012-2013. However, a survey conducted by the Rabbit Association and Fund (2012) recorded an average of 67,000 pet rabbits are relinquished to rescue centres per year, and a recent survey identified that up to 75% of pet rabbits are being mistreated, with issues including; incorrect housing, incorrect food, and incorrect socialisation (McVeigh, 2011). This study also identified 60% of those surveyed as not realising rabbits were intelligent and required mental stimulation, which supports concerns commonly identified in veterinary practices as the ignorance of animal's needs being one of the most common causes of poor husbandry (Stapleton and Hedley, 2015). Additionally, vets have indicated that three-quarters of rabbits suffer from overgrown teeth or other dental issues (Burgess Pet Care, 2015), and one in four rabbits have a weight problem (The People's Dispensary for Sick Animals (PDSA), 2015). Many of these issues can be reduced through promoting natural behaviours including gnawing, hiding and digging, which also increases activity levels. With the cost of keeping a rabbit at £1,000 per year of its life span (PDSA, 2015), finding effective enrichment is also relevant.

In addition to the issues surrounding mistreated pet rabbits, there are also welfare concerns for other common small pets, including guinea pigs, hamsters, chinchillas, gerbils, ferrets, rats and mice. Despite there being approximately 1 million pet guinea pigs, half a million hamsters, and about 400,000 gerbils, mice or rats in the UK (Pet Food Manufacturers Association, 2012), research regarding the welfare of these pets is limited. However, Fawcett (2011) highlighted that poor husbandry and diet are the leading causes of morbidity and mortality in guinea pigs, and owners are often unaware of common health issues associated with these. Additionally, there is evidence of mistreated guinea pigs when searching online for rescue centres,

with many stating the poor conditions in which these animals are found in.

Enrichment has been trialled at Dobbies Garden Centre with rabbits, guinea pigs, hamsters, mice, gerbils and birds, to promote species-specific behaviours. Additionally, enrichment provides the public with enrichment ideas for species often overlooked in terms of intelligence, husbandry and welfare requirements. The focus of the enrichment investigated in this paper will be primarily on rabbits, but many examples are applicable to other small pets.

The Role of Pet Shops

Pet shops are often associated with a negative stigma in the United Kingdom as a result of welfare concerns. For example, studies have suggested that pet shops provide inadequate space, have incidences of abnormal behaviour such as pacing and circling, and inappropriate human-animal interactions, such as shouting or banging on the glass of enclosures (Casamitjana, 2003). Despite this perception, the pet shop continues to be the most popular place to purchase a rabbit or other small animal, with 38% of pet owners purchasing a rabbit from a pet shop (PDSA, 2015). There has also been an increase from 14% to 18% in rescue centres being used since 2011, and a decline in people obtaining pets from relatives (PDSA, 2015). In addition, 26% of rabbit owners in the PDSA (2015) study took advice from a pet shop, demonstrating that pet shops have a relevant influence on the care and welfare of animals, both in the pet shop environment, and beyond the pet shop.

Aims

- How can welfare be improved in the pet shop and set an example to improve welfare beyond the pet shop?
    - What enrichment opportunities can be provided to enhance natural behaviours of species and provide a mentally stimulating environment?
    - How can education in pet shops be improved to enhance involvement and care of pets, improve human-pet relationships, and potentially reduce the number of pets being rehomed or mistreated?

The Importance of Enrichment

Enrichment has numerous definitions, but one example states modifications to the captive environment that enables the animal to enhance physical and psychological wellbeing through providing stimuli that meets the species specific needs (Baumans, 2000). Enrichment programmes were initially developed in the zoo environment, in order to enhance the lives of captive animals (Shepherdson, 1998), but enrichment is becoming a more integral part of domestic animal husbandry. It is the owners legal duty to ensure the environmental (exercise space, hiding places, bedding) and behavioural (gnawing, digging, hiding, exercising and foraging) needs of the animal are met by the owner (RSPCA, 2016; Animal Welfare Act 2006), demonstrating the significance of enrichment.

Research on rabbit welfare has identified that a barren environment can result in a lack of mental stimulation and the inability to perform natural behaviours (Katsarou *et al*., 2011). Consequently, The Royal Society for the Prevention of Cruelty to Animals (RSPCA) has identified that mistreated pets may display abnormal behaviours such as excessive grooming and aggression (Srivastava *et al.,* 2014), or health issues, including obesity, malnutrition and overgrown teeth (McVeigh, 2011). Furthermore, the issues associated with barren environments are not limited to rabbits, and similar issues have been identified in other small pets, including guinea pigs and small rodents, including hamsters. Additionally, many rabbits and guinea pigs are housed alone, which can be controversial considering their naturally sociable and group behaviour in the wild, and extra stimulation to compensate is vital for animal wellbeing (RSPCA, 2016). Enrichment can assist with promoting natural behaviours and reduce the risk of issues associated with barren and under-stimulating environments.

Types of Enrichment

Enrichment can include: environmental enrichment, habitat enrichment, sensory enrichment, food enrichment, social groupings and behavioural conditioning (Association of Zoos and Aquariums, 2014), and all of these can contribute to enhancing natural behaviours and improving animal wellbeing. The enrichment investigated at Dobbies Garden Centre has included all types, and the success of these to improve activity, provide mental stimulation and to provide ideas to the public for their own pets has been monitored. Both synthetic and natural enrichment were used and these were further refined to shop-bought and recycled enrichment, to demonstrate that effective enrichment does not need to cost a lot, and it may be more accessible than previously thought. Some of the observations that have been recorded can be seen in Table 1.

Enrichment	**Shop-bought/ Recycled**	**Observations**
Plastic Treat Ball	Shop-bought	Increases foraging opportunities, locomotory activity and mental stimulation.
Plastic Tunnels or houses	Shop-bought	Provides a hiding place, and promotes locomotory behaviours such as running and jumping.
Puzzles (such a slider puzzles)	Shop-bought	Promotes mental stimulation, foraging, and demonstrates intelligence to the public.
Wooden Shop-Bought Toys	Shop-bought	Promotes throwing and gnawing behaviours. Shown to deter from undesirable behaviour such as gnawing on cage bars, particularly in hamsters.
Plant pots	Shop-bought	Provides a hiding place and an object to manipulate, such as throwing.
Cardboard/Hay Tubes	Recycled and shop-bought	Different shapes and sizes for different uses. Can put food/hay inside to encourage gnawing or put holes in the tube so animal has to manipulate the tube to get food reward, so can provide mental stimulation. Large tubes can also act as a hiding space, also the opportunity to gnaw, and chew if made from hay.
Cardboard Boxes	Recycled	Large boxes can act as a hiding place, promote jumping, digging and gnawing behaviours. Small boxes can be thrown around, food can be hidden inside boxes to promote mental stimulation, gnawing and digging behaviours.
Willow Branches	Recycled	Promotes gnawing behaviours in various species including rabbits, hamsters, gerbils, lovebirds and budgies.
Paper	Recycled	Bags or Tissue – promotes throwing, digging, gnawing behaviour. Can hide food inside to enhance mental stimulation. Paper also acts as good nesting material for small rodents to collect and manipulate as required. Tissue paper also manipulated by rabbits, digging, scenting, and running around with it.

Scent Enrichment - Other animal scents, or natural scents such as lavender	Natural	Promotes digging, and scenting behaviour (particularly chin scenting in rabbits).
Box with Hay/Paper	Recycled	Promotes gnawing, chewing and locomotory behaviours, such as digging
Grass Box	Recycled	Digging, chewing, scenting behaviour (particularly chin scenting in rabbits)

Table 1: Examples of shop-bought and recycled enrichment used at Dobbies Garden Centre, for rabbits, guinea pigs and hamsters, and associated observations.

Benefits of Enrichment

The key benefits of providing animals with enrichment are promoting natural species-specific behaviours, such as, gnawing, foraging and scenting, and these benefits were observed with the animals at Dobbies Garden Centre. Providing animals with the opportunity to perform these behaviours can reduce the likelihood of some of the common animal wellbeing issues mentioned, such as overgrown teeth, inactivity, and behaviours related to boredom such as aggression or other undesirable behaviours. Additionally, increasing activity levels as a result of having more activities to do, such as foraging, gnawing, or hanging enrichment down into the enclosure, can counteract the risk of obesity. Some of the behaviours and benefits of enrichment will be explored in more detail.

Gnawing

Gnawing and chewing are important physical and psychological behaviours for some species, including rabbits, guinea pigs, hamsters and other rodents. Gnawing is significant when considering general activity budgets of rabbits, with gnawing and chewing behaviours making up a large proportion of their daily activities, with 70% of a rabbit's activity budget occupied by feeding (Baumans, 2005; McBride *et al*., 2006). A rabbit's teeth can grow 3mm a week (Meredith, 2007), guinea pig teeth can grow 2mm per week (Harris, 1984) and hamster, gerbil and mice teeth also continuously grow. This highlights the importance of providing animals with opportunities to promote gnawing, to reduce the risk of future dental health problems, including overgrowth, as identified particularly an issue in the rescue rabbit population. This is significant considering rabbit dental costs can vary between £40 and £200, and rabbits with chronic dental problems may require treatment every 4-8 weeks (RSPCA, 2012), so providing opportunities to perform these behaviours are significant to reduce these risks and associated costs.

It is also important to emphasise the importance of enrichment to promote gnawing in small rodents, such as hamsters. Hamsters are prone to behaviours, such as gnawing on cage bars, which can result in damaged teeth and can be dangerous if ingested or leaving sharp edges. This behaviour is commonly identified within pet shops, beyond the pet shop, and the laboratory environment. The latter example has been researched by Hauzenberger *et al*. (2006) and Gebhardt-Henrich *et al*. (2005), finding that providing more enrichment opportunities to increase locomotor activity, including digging and running, reduced this common behaviour. This demonstrates the importance of education on species behaviours, to promote enrichment, and to not overlook smaller pets, as these similarly require a stimulating environment which promotes natural and safe behaviours.

Foraging

Foraging is a natural behaviour in rabbits, guinea pigs, and small rodents; this is identified in both domesticated species and wild species, as a result of consuming high quantities of fibrous foods with low nutritional quality (Magnus, 2005; Stapleton & Hedley, 2015). When accounting for the time spent foraging, it

seems illogical to provide food in a bowl in a determined place (unless for reasons, such as monitoring food intake), and more so when considering the space restrictions in captivity. In doing this, prey species have a limited physically and psychologically stimulating environment that can result in destructive behaviours, or other undesirable behaviours. (Stapleton & Hedley, 2015). Therefore, providing opportunities to forage through activities including scatter feeding and hiding food inside or under cardboard tubes, boxes or other objects, can increase the time spent actively searching for food and is more mentally and physically stimulating.

Social Stimulation

Rabbits, guinea pigs and chinchillas are all social species, yet 57% of rabbits, 27% of guinea pigs, and 53% of chinchillas in the UK population live alone (PDSA, 2015), which causes potential welfare concerns. Conversely, the confinement of captivity can increase the likelihood of territorial behaviours and fighting, so pairs or groups of animals are not always suitable (Myers *et al.,* 1961). This highlights the importance of educating pet owners on the compatibility of individuals and species where suitable, as well as emphasising the requirement to interact with their pets, and provide animals with a physically and mentally stimulating environment, to alleviate potential boredom or frustration and improve wellbeing. Common behaviours in rabbits, guinea pigs, and hamsters that are socially isolated or in an under-stimulating environment include destructive behaviours, which can be household objects or the animal itself, including over grooming or fur pulling (Hansen & Berthelsen, 2000; Gun & Morton, 1995). Many of these behaviours may be reduced through ensuring pets are provided with opportunities to present natural behaviours.

Education

Displaying enrichment in the pet shop can enhance customer interest and employee-customer interactions, and therefore increase the opportunities to educate on improving pet care. An advantage of educating the public on benefits of enrichment such as increased activity, and how owners can play a more active role in the care of their pet, could potentially increase pet interest. Often children are involved with pets too, so giving ideas to parents to get children involved with making enrichment could be beneficial. This is particularly important as the RSPCA found those who bought rabbits lost interest after 3 months on average (BBC, 2006). Additionally, promotion of natural enrichment or objects that are often found in the home, rather than shop-bought, may be beneficial to increase the likelihood of using enrichment, when considering the price of keeping a pet. Finally, using enrichment in the pet shop to educate on the key issues commonly associated with these species, and demonstrating how to promote a mentally and physically stimulating environment, can ensure pet owners are aware of the complexity of caring for pet rabbits, both prior to and after purchasing a pet.

Training

In addition to the enrichment discussed, training through positive reinforcement can also be a useful tool to provide pets with mental stimulation, as well as training for behaviours that can aid the husbandry and care of the animal. Dobbies Garden Centre has attempted training with longer-term individuals, including rabbits and golden mantle rosellas, and there has been some success with identifying successful reinforcers, and training some basic behaviours, such as hand feeding and targeting. However, training complete or more complex behaviours has not been successful, as a result of an animal being rehomed, which is a key constraint in the retail environment. The benefit of understanding and emphasising positive reinforcement and maximising positive human-animal interactions has been recognised by all staff.

Feedback from customers at Dobbies Garden Centre has indicated that training information can be interesting and useful, so it is important to provide an overview of the physical and psychological benefits that training can provide, where appropriate. For example, litter training, target training, scale training, and habituating animals to being handled around areas such as the mouth and ears, to monitor health more intricately are all benefits of training that can improve care and wellbeing. The use of training to improve han-

dling is significant, when considering 61% of rabbits are considered as not calm when being handled by the owner (Rooney *et al.,* 2014), and is also beneficial for creating a patient that will voluntarily participate with veterinary care (Brown, 2012). However, training is a complex topic, and considerations must be given to educating owners on basic positive reinforcement, as opposed to punishment which can be detrimental to the human-animal relationship (Rabbit Awareness Week, 2016). Further advice should be provided on how to maximise the effectiveness of training mechanics if using tools, such as clickers or antecedents, understanding the impacts of both human and animal behaviours, and training session frequency and duration. Additionally, nutrition must be considered, with regard to understanding the reinforcer value to the animal (if food is used as a primary reinforcer), as well as being aware of how reinforcers could contribute to nutritional imbalances if not monitored. These are just a few examples of areas that must be reviewed before commencing training with any animal, but further education on this is required in the small pet population, to improve human-animal interactions and animal wellbeing.

Problems with Enrichment

Using enrichment and trialling new ideas is not without problems, and the benefits and issues vary between species and individuals. For example, some guinea pigs and rabbits soiled the cardboard boxes and required replacement boxes each day, which became unfeasible. However, this was not every individual, so owners must continue to monitor the suitability of enrichment for their pets, with regard to hygiene and practicalities. Soiled cardboard also proves an issue for recycling, as these products will lead to contamination of newly made products, so owners must be aware that soiled materials cannot be recycled. Another concern with enrichment includes the potential of territorial behaviour or fighting when using enrichment in a situation with more than one animal. Owners must be aware of the importance of providing various opportunities for animals to engage with enrichment, and supervise these activities to ensure the safety of the animals.

Other Considerations

Providing enrichment in the pet shops also counteracts some of the negative stigma demonstrated in research, such as reducing incidences of abnormal behaviour and promoting natural and safe behaviours, such as cage biting in hamsters. Additionally, enrichment can increase positive human-animal interactions, through spending more time with animals in the pet shop. Furthermore, it is important to utilize the role of pet shops to convey information, considering the number of pets bought from pet shops, and the statistics supporting pet owners relying on information from pet shops.

It is not yet known whether focusing on improving enrichment and education at Dobbies Garden Centre or other pet shops has had a positive effect in the long term, as this is something that would be difficult to quantify, especially in the timeframe of this work. However, subjective feedback from customers has indicated that enrichment has been beneficial to appreciate the intelligence of the pet, and provide the pet with more opportunities to perform natural behaviours, in ways that are safe and often inexpensive, due to using recycled materials in the home. The potential of enhancing enrichment opportunities to influence animal wellbeing in pet shops, and to help to drive education of pet owners, to appreciate and fulfil the mental and physical capabilities of their pets, has been identified in some studies. For example, Edgar & Mullan (2011) suggested that properly trained pet shop staff and veterinarians have the potential to be the best source of up-to-date and accurate information on rabbit health and welfare. Additionally, pet shops have an important role in educating owners on aspects of diet, housing and social needs.

Finally, the number of pet shops selling live animals has decreased from 73% of 3,500 pet shops in 2005 to 45% in 2014 (OneKind, 2014). It must be considered whether this has an effect on whether pet owners approach pet shops for care and welfare advice, as retail staff may be employed as opposed to animal care staff, but it is hoped that pet shops do take advantage of any opportunities to improve pet care while they are available.

Despite all the benefits of enrichment highlighted in this paper, it must be appreciated that there are

various reasons that pets may be abandoned or mistreated. There are also many other concerns with regard to breeding of pets and the dietary requirements and the effects on health, such as using pellet diets rather than muesli diets and ensuring correct hay quantities are provided. Furthermore, constraints in the retail environment with regard to money, support, understanding, and time that must be acknowledged. It must also be considered that behaviour problems may require further veterinary or qualified behaviourist expertise; therefore, using enrichment and educating on enrichment may be restricted or have restricted benefits.

The Future

The PDSA (2015) survey found that there been a rise in the number of rabbits that play with toys on a daily basis, rising to 49% in 2015 from 38% in 2011, 46% play in their run and 40% in the garden. However, only 24% of rabbits get the opportunity to dig on a daily basis, which suggests there are still improvements that can be made to help keep rabbits mentally stimulated. As research has suggested that pet shops evidently have an important role for advice for pet owners, and it is anticipated that opportunities in pet shops are undertaken to promote good welfare and educate pet owners to influence better pet care with more enriched lives. Examples of future plans can include running workshops for children and families to continue to educate on animal care and influence the right decision on whether to commit to a pet or not. Another example is to provide leaflets on enrichment ideas so information can broaden past the pet shop, and this provides another format of education. Furthermore, pet shops should continue to educate customers before purchasing a pet, and reduce impulse purchases. PDSA (2015) found 12% of rabbit owners did not do any research before purchase, and 27% found out information from a pet shop. It is important to continue to make certain that pet owners are aware of the financial, time, and effort commitments prior to obtaining a pet.

Conclusion

Although the topic of enrichment with domestic pets may seem quite mundane, it is evidently a key area of animal care and welfare that continues to require improvement. Whether people are in support of pet shops or not, data indicates that pet shops play a significant role in communicating with pet owners. Therefore, it is important to highlight that pet shops have the ability to promote; high welfare standards, enrichment, high quality animal behaviour and care knowledge, and the ability to convey this information to pet owners to improve animal welfare beyond the pet shop.

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Working With a Worried Wallaby: Strategies for Training Fearful Animals

Ellen Dreyer

Brevard Zoo

Obtaining regular weights on captive animals is an important part of captive animal management. Training animals to voluntarily step on a scale and hold still to be weighed is the most positive, least intrusive way to monitor weights to ensure dietary needs are being met. Training animals for voluntary weights is a priority in the Austral/Asia area at Brevard Zoo. Bringing the scale behavior under stimulus control proved challenging with a swamp wallaby (Wallabia bicolor) named Thumper. Due to his reclusive nature and wariness of people, he had never made progress in training sessions. The Austral/Asia team devised a new training strategy focused on increasing the swamp wallaby's comfort and encouraging him to participate in training sessions. Important facets of the revised training plan included increased desensitization work, scheduled reinforcement times, use of a laser pointer instead of a traditional target stick to allow increased distance during training sessions, and precise communication between all trainers. Voluntary weights are now obtained monthly on the swamp wallaby. The strategies used for Thumper can be applied to other species and individuals, bringing new possibilities to animal welfare.

Introduction

The swamp wallaby has the distinction as the only totally solitary macropod. In the wild, swamp wallabies are secretive and elusive (Staker, 2006). The Brevard Zoo houses a male swamp wallaby named Thumper in the Austral/Asia area of the zoo. Thumper is a naturally reclusive animal, much like his wild counterparts. He has a large flight distance which can make routine husbandry like visual exams difficult. Some days, just getting a visual on Thumper took up to 30 minutes as he bounded from bush clump to bush clump to avoid being spotted. The Austral/Asia keeper team had been working on desensitizing Thumper for years without much progress.

Several medical issues requiring him to be kept in a holding stall and restrained to receive medical care caused setbacks in attempts to increase his comfort around keepers. When approached by people, Thumper exhibited stress behaviors including stomping his feet hard, attempting to flee, charging, licking forearms, and body trembling (Corradin, 2006). His medical issues increased the need to obtain regular weights to check his body condition and dose medicine as needed.

Thumper was minimally successful targeting a lollipop style target. He would target a couple of times for his favorite reinforcers but he did not like to move far from the bushes where he spent a large part of the day and often darted away rather than participate in the training session. Ready to try something new, we overhauled his training plan and used a multi-pronged approach to create forward progress. A significant change we made was utilizing a laser pointer to target Thumper onto the scale. The Austral/Asia team came up with the idea after having success using a laser pointer to enhance keeper talks with Visayan warty pigs. The new training approaches were written up as an animal training plan and training sessions began immediately after supervisor approval.

Method

Obtaining voluntary weights was the end goal of the training plan but we also hoped to achieve better daily visual checks, reduce flight distance, reduce stress behaviors, and increase his comfort being

closer to us. At this time, the Austral/Asia team consisted of three keepers who all agreed to dedicate time each day to implementing Thumper's training plan. Rather than assigning a primary trainer to work on the behavior as we usually would with a new behavior, we decided to allow each Austral/Asia keeper to train Thumper simultaneously in order to increase the amount of sessions and attention he would receive. This allowed Thumper to be trained every day of the week. The following sections detail the important parts of the training plan that finally led to a breakthrough and the reduction of Thumper's stress behaviors when around keepers.

Desensitization

Previous attempts to desensitize Thumper to the presence of people in the exhibit had little success. A primary reason could have been because he usually stayed hidden deep inside clumps of palm fronds, making the process much more difficult. We decided to desensitize Thumper using counter-conditioning, a form of active desensitization where new stimulus is paired with reinforcement (Ramirez, 1999). We gave him his morning diet to reinforce him while we took the time to stand nearby. Using counter-conditioning for desensitization had been tried in the past but his lack of motivation combined with time constraints put on trainers resulted in no progress.

Also at this time, we made a change in our diet schedule for the exhibit. Instead of leaving food overnight, we began to pull the food at the end of the day to encourage a kangaroo also housed in the exhibit to take medicine in the morning. While the change allowed us to successfully medicate the kangaroo, the change also had a direct effect on Thumper's motivation. Suddenly, he was out every morning waiting for his diet. Initially, we placed the food bowls outside and let him eat with the rest of the mob while we stood across the yard. After a week, we began feeding all 1.5 kangaroos in the barn and gave Thumper his diet outside. At first, we stayed approximately 6 meters (20 feet) away. Each day, we got a little closer to the food bowl we gave him. Soon, he was approaching us when he saw the food bowl in our hands and we could stand next to him as long as we did not make sudden movements.

Scheduled Reinforcement

Another technique we used was having scheduled reinforcement times. The goal of having scheduled reinforcement times was to give Thumper more opportunities to earn reinforcement with very low criteria behavior in order to build our relationships, increase his understanding of cue-behavior-reinforcement to help in the shaping process, and build behavior history. Gaining the animal's trust is an important step toward relationship building (Ramirez, 1999). We began by choosing the end of the day when the closing shift keeper walked past the exhibit around 5:00 P.M. because the time was convenient and the training session was easy to work into our schedule. Rather than enter the yard, the trainer would stop on the boardwalk in front of the exhibit and call Thumper's name. If he came out, we tossed him reinforcement. We called his name again and if he came closer, he received reinforcement. The criteria for reinforcement was so low, he received the reinforcement as long as he came out of the bushes. Soon, Thumper was often waiting for us at the end of the day. If not, he began to reliably come out when his name was called. We noted he was much more responsive with us out of the exhibit. We added another session like this right before noon but he was less responsive due to the time of day. These short daily sessions helped us build up a positive association with Thumper and increased our observations of his behavior.

Laser Pointer

Knowing we needed to meet Thumper at his current comfort level rather than push him beyond, we decided to use a laser pointer for targeting instead of the lollipop target. To increase our distance from him even more during training sessions, the trainer stayed on the boardwalk surrounding the exhibit and opportunistically waited for a time when Thumper was visible. During the first session, the trainer pointed the laser pointer next to Thumper. He immediately investigated the green dot and was bridged using an already established whistle bridge then reinforced using a shelled and halved peanut. The laser pointer was

gradually moved farther from Thumper using approximations.

Initially, Thumper did not always stay at training sessions long. Sometimes, he would target a couple of times then duck back into the bushes. If another animal approached, a guest walked past, or the wind blew, he would often hide and many times he would not come back out. Sessions ended when he left the vicinity of the trainer. After 2 weeks of targeting with the laser pointer, Thumper began coming to the boardwalk at the front of the exhibit when he heard us passing. Next, we began standing inside the exhibit during training sessions but we kept a far distance from him.

After 5 weeks of implementing the new training plan, Thumper was reliably targeting the laser pointer, approaching in the morning for his diet, and coming to the front of the exhibit when cued during the scheduled reinforcement times. Trainers continued to the next step of the training plan to obtain a voluntary weight. For the first attempt, the scale, a portable large animal scale, was placed in the exhibit near where Thumper was sitting in the bushes. The trainer targeted him near the scale using the laser pointer but a loud noise scared him away and the session ended. Three days later, we tried again. Thumper again targeted near the scale but the male kangaroo hopped on the scale and would not let Thumper near it. One trainer distracted the kangaroo while the other trainer asked Thumper to target onto the scale using a combination of a lure of cooked sweet potato on the scale and the laser pointer to target him (see Fig. 1). When he targeted close enough to the scale to see the sweet potato, he immediately stepped on but his tail was hanging off so the weight was not accurate. After finishing the sweet potato, Thumper hopped off the scale. Using the laser pointer from a distance of about 3 meters (10 feet), the trainer targeted Thumper onto the scale from the long end so his entire body including his tail was on. The trainer moved the laser pointer slightly forward as Thumper stepped onto the scale to make sure he was completely on the scale. Once on, the trainer bridged then jackpotted Thumper by throwing him high-value reinforcers. Over the next few training sessions, the laser target was faded and a cue for scale was added.

Figure 1. A trainer attempts to target Thumper onto the scale using the laser pointer.

Communication

Because all three trainers were working simultaneously with Thumper, precise communication was a vital part of the process. As much as possible, we wanted to use the same body language, cues, and reinforcement delivery. When we could, we watched each other's training sessions. We kept detailed notes on each training session and wrote further comments in our communication log. We would vary reinforcement then record what he did and did not prefer. When one trainer had a great session, we made sure to tell the others exactly what happened without using constructs to keep communication as clear as possible.

Most importantly, we recognized when we needed help. For example, when we began using the scale, the entire team watched the first session while one trainer asked Thumper to target onto the scale using the laser pointer. When she was not successful, the next session she asked a different trainer to try and

Thumper got on the scale during that session. Because each trainer had a slightly different behavior history with him, asking a trainer who had a better relationship with him increased the likelihood he would do the behavior. The first trainer then continued to build her relationship with him and was able to target him onto the scale in future attempts. Many factors can contribute to success in a training session, but taking the true team approach and leaving our training egos at the door helped immensely.

Discussion

Thumper's breakthrough of getting on the scale was the first of many. Following this achievement, Thumper rapidly began doing things he had never done before including taking reinforcement from our hands, voluntarily entering the barn, and allowing us to touch him (see Fig. 2). We have successfully recorded monthly voluntary weights for Thumper since 22 October 2015 when he first got on the scale. We also noticed he began socializing with the kangaroos more. He now often naps with the mob, allowing guests to see him. During a recent volunteer encounter, he took a peanut from a volunteer who had never been in the kangaroo exhibit or interacted with Thumper in any way. His flight distance has significantly decreased and we do not see stress behaviors even when we stand in a holding stall with him where he would previously have had a high stress level. We can now monitor him better for any signs of a reoccurrence of his medical issues, including an abscessed tooth, which requires close observation of his face for swelling, watery eyes, and difficulty eating.

Figure 2. Thumper takes reinforcement from a trainer's hand.

A key component to his success with desensitization using counter-conditioning was removing the diet overnight. This directly raised Thumper's motivation without negatively impacting his weight. Because they have access to food all day and his weight remained constant, the motivation was likely more psychological. Although the change was not made because of Thumper, changing how or when food is given without decreasing the amount of food is a training tool we will continue to use in the future.

Thumper did not require much desensitization with the large animal scale used. While we did try placing food on or near the scale as a lure to encourage Thumper to approach, this was not helpful for positioning Thumper onto the scale correctly so we did not continue doing it. Seeing the scale in the exhibit every month when we weighed other animals in the exhibit likely increased Thumper's comfort with being next to and on the scale. Because the red kangaroos and emus are weighed before diets are fed, Thumper would sometimes approach the scale, looking for food. He also had the opportunity to observe other animals standing on the scale and getting reinforcement, possibly leading to observational learning.

"One of the best ways to build trust is through a high rate of positive reinforcement" (Martin, 2015, p. 2). The use of scheduled reinforcement sessions with very low behavior criteria allowed us to have a high rate of reinforcement. Standing outside the exhibit for these sessions allowed us to work with him despite

his large flight distance. In the same exhibit, we are currently using this strategy to build trust with a female Reeves's muntjac, MooShu, which displays stress behaviors when keepers approach (see Fig. 3). Building up behavior history with her has already increased her progress with target training and visual checks.

Another key to our success was changing the training plan from a traditional target stick to a laser pointer because Thumper was so flighty. This allowed the trainer to stand outside his flight distance and gradually move from outside the exhibit to inside the exhibit. Laser pointers have been used as training tools successfully for other species in the Austral/Asia area of Brevard Zoo including Red kangaroos, Visayan warty pigs, and Reeves's muntjacs.

Figure 3. Trainers build trust with Thumper and MooShu during scheduled reinforcement times.

Only a few institutions in North America exhibit swamp wallabies. Now, guests who visit Brevard Zoo are able to see Thumper, and they may even see a training session with him, watch a keeper talk featuring him, or watch him interact with enrichment - not bad for a solitary macropod.

Acknowledgements

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Big, Bold, and Back In Alaska; Wood Bison Restoration Project

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The last wood bison to roam Alaska disappeared more than 100 years ago. In 1991, a dream began to bring the largest land mammal back to the largest state in the union. In 2003, the Alaska Wildlife Conservation Center (AWCC) partnered with the Alaska Department of Fish and Game (ADFG) to restore wood bison to the USA in Alaska. AWCC accepted and cared for 13 Canadian wood bison in 2003, and 53 more in 2008, growing the population to 145 by spring 2015. With constant stressors facing this project, both politically and environmentally, it would appear an impossible feat. Against all odds, in June 2014, the Nonessential Experimental Population (NEP) rule was agreed upon by ADFG and the US Fish and Wildlife Service. The Alaska governor approved the release in August 2014, and the following 6 months were rigorous with planning, collaborating, and hoping. On March 22, 2015, those hopes were realized. For safe transport and release, a training plan was put in place that conditioned these bison for behaviors that would ultimately lead them to freedom. The staff had to be creative, utilizing techniques that would not potentially establish a dependence on a human-animal relationship that could jeopardize their survivorship. Over the next 6 months, 130 bison traveled by truck, plane, and river boat to start their new journey. At long last, this iconic species has come home.

The Alaska Wildlife Conservation Center (AWCC) is located 45 minutes outside of Anchorage, Alaska on the southern edge of the Turnagain Arm and the entrance to the Portage Valley. It is a 200 acre, 501(c)3 nonprofit facility focused on conservation, education, and recreation. The center is dedicated to the care of orphaned, injured, and displaced native Alaskan wildlife.

The facility was founded in 1989 by Mike Miller and was opened to the public in 1993. It has over 50 animals spread throughout 15 exhibits and ample acreage allows visitors to view wildlife in spacious habitats while in a scenic setting. AWCC works closely with state and federal agencies to provide year round emergency treatment and rehabilitation to a variety of wildlife including; moose, elk, caribou, black and grizzly bears, sitka black tailed deer, lynx, foxes, gray wolves, musk ox, birds of prey, and wood bison.

In 2003, 13 wood bison were found illegally kept in a remote location in Alaska. Due to their endangered status, it is illegal to have them without proper permits. The animals were confiscated and the Alaska Department of Fish and Game (ADFG) reached out to the AWCC in hopes that they would house the confiscated animals and grow the herd to a releasable size. AWCC agreed and this was the beginning of the wood bison restoration project partnership.

Wood bison went extinct from Alaska over 125 years ago. The species suffered from being overhunted, and eventually the population dwindled to the point that it could not sustain itself. The last groups of genetically pure wood bison were only found in a remote part of Canada. The Canadians developed their own restoration program to bring the species' numbers back. The term "wood bison" is used to describe this particular subspecies, since they are different than their southern cousin, the "plains bison." Subtle differences separate the two, mostly due to morphology and adaptations needed for living in their respective environments. Wood bison are truly North America's largest land animal.

In 2008, ADFG received approval for the translocation of 53 additional wood bison from Canada to AWCC. These 53 joined the original 13, and in total, increased the herd of captive wood bison in Alaska to 66.

The project finally was off on the right "hoof."

Time was spent locating habitat that could sustain a viable population of wood bison. There were three main locations ADFG deemed sustainable and of these, the Innoko region showed the most promise. It took years of planning and regulation changes to finally get approval for the wood bison to be released back onto the Alaskan landscape. That news came in October of 2014. The next 6 months were rigorous with planning and preparation; bison-day ("B-day") was vastly upon us.

In order to get the bison to their release sight near Shageluk, Alaska, a plan needed to be developed to safely move the animals from their temporary holding area to the place where they would be permanently released into the wild. Careful action was taken to ensure the bison were not tractable and that they remained this way to have the most successful chance at survival. It was determined that the greatest possibility of moving the herd successfully, with the minimal amount of interference would be to train them to follow a vehicle from a safe distance. Once at the release site, they needed to follow a snow machine (snow mobile) across the Innoko River, a large river that if not crossed, could leave the herd in jeopardy of not reaching the desired habitat.

This training plan was executed utilizing the AWCC vehicles which dropped food behind them and allowed the wood bison to associate reinforcement with the snow machines and ATV's. Months of driving through the enclosures and leaving paths of food for these giants became a crucial piece to the release puzzle. The bison took to this training approach rather quickly and it seemed as though we were ready to introduce them back into the wild.

The plan was for the bison to follow Tom Seaton, ADFG Bison Biologist, across the great Innoko River. The first group of 100 female and young bison were flown out to Shageluk and soft release techniques were put into practice, which involved ADFG dispersing hay within a 5-10 mile radius of the release site to allow the herd to have feeding stations as they explored and found food.

On 3 April 2015, the day had come for the release of the wood bison and the ultimate test of our unique training plan. Tom Seaton opened the temporary enclosure for the animals and successfully led all 100 wood bison to freedom. Thanks to an incredible effort by hundreds of people and dozens of organizations, the United States now has a population of wild Wood Bison for the first time in over 100 years.

The Great Escape! Rocky Mountain Goats Climbing Beyond Barriers.

Patty Wallace and Jeremy Dillon

Cheyenne Mountain Zoo

In the fall of 2014, the renovation of our existing Rocky Mountain Goat (RMG) barn was completed with the addition of a new side yard. The new additions included fencing around an existing concrete retaining wall for containment and a pergola structure at the front of the enclosure as well as a training space for shows. The animal keepers for RMGs were asked to brainstorm ideas for a natural behavior show. The show would be a time for guests to not just see our goats, but to experience them in new ways - helping them to fall in love with a species that was close to their home. As part of this brainstorming two behaviors emerged; climbing on a ledge to demonstrate their amazing balancing skills and climbing onto the pergola, where they would be standing directly over guests' heads. Both of these behaviors are currently demonstrated to our guests in a daily show (weather permitting).

This presentation will outline the process Cheyenne Mountain Zoo staff went through to successfully train these behaviors from start to finish, including antecedent arrangements, barriers we faced and overcame, lessons learned, and how these amazing animals' lives have been enriched and enhanced since the implementation of our Rocky Mountain Goat Training Program.

In the fall of 2014, renovations to our existing Rocky Mountain goat (*Oreamnos americanus*) barn and yard were completed with the addition of a new side yard. This side yard was built with the intent to be an enrichment yard and potentially a yard for future kids. It was built against an existing concrete retaining wall and we thought it would be great to use this wall in a way that would demonstrate what a goat might look like climbing on the cliffs of their natural habitat. But why stop there? In the plans, a pergola structure was built for shade purposes but we wanted to make use of this structure in a creative way as well. "Let's get a goat on the roof!" No one is quite sure who to credit for this brilliant phrase, but as it goes with so many things, we were determined to make it happen.

After construction was completed in the yard, all that remained to build was a climbing wall and design some platforms over the pergola. This project was completed by our Animal Behavior Programs Manager (ABPM), Jeremy Dillion, with the help of our "Project Guy" and fellow Animal Keeper, Anthony Nelson. They very carefully attached 4x6-inch wooden beams of varying lengths and ranging from 1-3 feet apart along the retaining wall, an angled platform in the corner between the wall and the barn, and placed a 2x2-foot platform at the end that a goat could easily turn around on. We call this section "the wall". They used the same platform design and attached four of these platforms to the top of the pergola. The final platform was placed directly over the head of the trainer, giving our Zoo guests an amazing, up close perspective and unique photo opportunity. The next step was to construct a ramp that would allow the goats to access these platforms. As part of the exhibit landscaping, several boulders were placed just to the north of the pergola and could be utilized to support the ramp. The ramp was built and attached to the pergola with hinges so it can be dropped when animals are in the yard unsupervised. This part of the plan was now complete and we could start training goats in their new yard.

At the onset of this project we were paired with fellow animal keeper Rick Hester from our Training Mentor Program. Rick's role as a mentor was to come down and observe/coach training sessions. With his extensive training knowledge and background and his dedication to our animals Rick played a major role in

this process. We spent many hours talking through training plans, problem solving and trying new things, all with the common goal of sharing information and learning from each other.

Our herd at the time consisted of 1.2 Rocky Mountain goats, none of which had any prior formal training. We decided to start our training with the two youngest goats, Honovi and Yahzi, since they had been hand reared and a positive relationship had already been established. The easy part was getting them to come close to us; the hard part was getting them to take food from our hands. As it turns out, those two goats were not interested in receiving food this way. We tried several different types of produce, hay cubes, fresh cut grass, browse, wheatgrass, even dandelions. They would not eat any of it. Somewhere along the way, Honovi and Yazhi decided that carrots and apples were pretty good and would take them from our hands. We threw in some sweet feed and this combination was a recipe for success; this was the first victory in a project that was full of trial and error. We also found that during summer months the motivation in the hot afternoon sun was lacking and even shifting was a struggle. Since we could not control the weather, we adjusted our schedule and chose to train in the cooler mornings. As a result, we noticed the goats were more likely to train. We officially established 10:30 am as RMG training time and to this day it is fixed into our schedule and weather permitting, so is the RMG show.

Before we could let the goats into their new yard, more landscaping had to be completed, which included planting new grass and trees. While these improvements were aesthetically pleasing, they posed a challenge to trainers in the form of competing reinforcers. Carrots and apples could not always compete with fresh grass and a new environment. Our solution was to give the goats access to explore the new yard for at least 30 minutes before a training session. This allowed them to exhaust some of those competing reinforcers.

Once we had created some motivation and laid some ground work for training sessions, we started training show behaviors. Yazhi showed more motivation by being the first one willing to shift over to the yard, so we started her on the wall first. The initial ramp was well within the climbing capabilities of a RMG, but she refused to make the jump from the ground, so we adjusted our antecedents by simply adding a stump to the foot of the platform. Trial and error was key as the stump was not tall enough and had to be adjusted twice more before she was comfortable enough to explore the ramp. We could not, however, get her to place her back feet on the ramp and if she slipped at all, she would jump down. After several sessions without progress, we re-evaluated our ramp and platforms and agreed to extend these by a few inches to set her up for success so she would be more likely to reach the end. As it turns out, we were right. Once the platforms were adjusted from 6 to 10 inches, Yazhi was up on the wall. We used a prompting strategy that included targeting and baiting to get her to walk along the platforms. The fence on top of the retaining wall was built with 4x4-inch steel mesh so she could see us walking next to her and we were able to reinforce by handing her food directly for more than half the distance to the final platform.

Another example of proper antecedent arrangement came when it was time for Yazhi to round the corner. The platform adjustments were good and Yazhi had no problems with the straightaway, but when she got to the corner beam she lost all confidence and would jump off. The angle of the beam attached to each wall gave her little area to land on. We made a larger platform in the corner which provided adequate landing space and allowed Yazhi to confidently make the turn. Once this challenge was successfully worked out, we used our extendable target pole (with a cup taped to the end) to bait the final platform. Yazhi successfully completed the wall behavior, but we still had several hurdles to overcome before it could be considered "show ready." We learned from past experiences with other animals that prompts can be both a blessing and a curse. They are a great way to get a behavior to occur but if not faded quickly, they become part of the cue and can be difficult eliminate. To get Yazhi used to the ramp system, we had been prompting her with our bodies by walking along the fence. It had become part of the cue as evidenced by her unwillingness to do the behavior without one of us there. Fading this body prompt was one of the biggest challenges we faced, but with a lot of patience, we succeeded. We took a few steps back and started with one trainer at the bottom training panel to give the cue and another trainer along the wall. By using small approximations we moved the second trainer further out of view until eventually they were hidden in a keeper area; Yazhi now solely relies on her trainer for that information. Because the 2x2-foot platform at the end was a little crowded with a goat and a pile of produce, we placed a bracket on the wall just to the right of the platform

that would hold a bowl and could be used for remote reinforcement. Practice makes perfect and Yazhi does this behavior during the show reliably and confidently and amazes guests with her energy and grace.

When we started training the pergola behavior, we realized there was a possibility of creating a "code green" (our facility's code for an animal being out of their enclosure) and we had to talk about safety. We took many precautions, including having tools ready, talking with other staff members about the best way to react if one of the goats decided to jump off the roof, and starting earlier in the day before the zoo was busy with guests. We also made a radio announcement to all animal units when starting the process so they knew to be ready in case this happened. We also needed to decide if we were going to let our adult male (Honovi) make the climb. He was much larger than the females and we were not sure how he would react to people in a code green situation. We decided to take the risk, and both Honovi and Yazhi began the training process. We looked back on the lessons learned from the wall behavior and adjusted our antecedents again. This time, the ramp was too steep, so we asked our horticulture department to help us problem solve. We landed on a plan to utilize natural logs to extend the climbing structure, which made the angle for the ramp less severe. We cut notches out of the log that allowed better traction and reduced the possibility of slipping, thereby increasing the chances for success.

Training the pergola behavior was a two person job and our ABPM Jeremy Dillion was happy to help. He decided to take the primary trainer position for Yazhi and I took on that role with Honovi. We trained both goats 5 days a week and worked it into our daily routine, which made it possible for guests to watch the process. We started by leaving the ramp down and gave them free access to the yard with lots of treats on the "stairs" of the log to get the goats accustomed to the first section. Once they were both seen ascending the log on their own, we faded out the baits and began prompting the behavior with a target stick. We did this through the use of an extendable target pole with a cup artfully duct taped to the end. One trainer was up front at the training panel and the other was along the wall using the target pole. We took advantage of their history with target training and used small approximations to move them farther away from us. The cup on the end was a useful tool to deliver reinforcers immediately once they reached the target. By doing this we were able to lead them up the log and deliver carrots, apples, and sweet feed all along the way. Though this sounds simple, using a 25-foot target pole is both awkward and challenging. As the saying goes, "What goes up, must come down", and at first both goats jumped off the end of the log and onto a boulder pile that was about 3 feet below. This posed a problem since we did not want them to get used to jumping off, as that would not be an option once they got to the top. The target pole was deployed again and they had no problem turning around on the log. Repetition builds confidence and soon we had both goats up and down the log and back over to the training panel for high magnitude reinforcers. Our next step was to put the ramp in place and target them up towards the top. The original ramp was a structure that was designed by Jeremy and built and mounted by our maintenance staff. It was approximately 18 inches wide with 1x2-inch boards placed horizontally so the goats would have some foot holds. Trial and error came into play again as we soon learned that if they slipped on the boards, they would lose confidence and bail to the safety of the boulder pile. Our solution was to replace these smaller boards with pieces of logs that still had bark attached and place them closer together. This resulted in a ramp that gave them plenty of traction. We taught them to go to the top of the ramp, turn around and go back down to the training panel.

Teaching the goats to get onto the platform on the pergola was our next step. We had learned that if we made things easier, it would be more likely to occur. We added additional, smaller platform that bridged the gap between the top of the ramp and the first platform. We had a goat on a roof! Yazhi was the first to get there and she looked so great, but we were not done yet. We still had three more platforms to go (no, make that six, as we made more adjustments to the structure based on the goats' behavior and willingness to keep going). We learned a hard lesson as we were training Yazhi one day. She made it to the second platform and then as we brought the target pole up through one of the gaps in the pergola to prompt her to keep going, the pole startled her and she jumped from the roof. Thankfully, she jumped into the exhibit and was not hurt, but we made sure they could always see the target pole coming from that point on. Once these adjustments were made, it took about three additional sessions to get the goats all the way to the final platform. We could not depend on having a second trainer there to reinforce with the extend-a-cup, so we created another version with a bowl so the primary trainer could reinforce the goat once they had

all four feet at the final spot. There was something special about seeing a Rocky Mountain goat above your head against the background of blue sky. Even though they had done what we asked, it was not quite "show ready," as we still had to get them down and fade out the prompt. Getting them down the ramp was easy; we utilized the target pole to turn the goats around and head them back down the way they went up. We taught them that when doing this high energy behavior, the reinforcer for coming back to the training panel was huge.

The next step in making this a "show ready" behavior was to get rid of that awkward target pole, which was easy. It was almost as if they told us they did not need it anymore. Maneuvering a 25-foot pole around trees and climbing a ladder with it took some time and it was not long before the goats were going up so fast that we could not keep up. We simply presented the bowl at the end to deliver reinforcers once the behavior was complete. Peak show season was upon us and we had two of the three RMGs prepared to show off some of their natural behaviors. Honovi never did the wall behavior, but he was great at a few husbandry behaviors and when he would climb his 250-pound body to the pergola, it was always a fan favorite. Yazhi does not hold still for long so husbandry behaviors and found them more difficult, but she likes the remote behaviors. She would offer them without being cued and do them multiple times, but we wanted to know: does she actually know the cues? We put her to the test by making sure the two cues were distinct from one another. One of the antecedents for the wall was that she always began on the left side of the training panel. The trainer would give the verbal cue "up" and side step to the left and out of her line of vision. When asking for the pergola behavior, the trainer made sure Yazhi was facing towards the right side of the training panel and then give the verbal cue "climb", sidestep to the right, grab the pre-loaded extend-a-pole, step back and raise their right arm. We started tracking how often she gave the correct response to each cue. If she was successful with the given order multiple times we would cue the other behavior. The evidence suggested that she was learning the order rather than the cues. She would start with 100% accuracy after multiple trials of a given order, but she would offer the incorrect behavior if the order was changed. We ultimately relied upon a specific order in the show to get reliable behavior and follow a concept taught to us by Steve Martin; Start big - end bigger.

Since we implemented the training program with the Rocky Mountain goats at Cheyenne Mountain Zoo, we have made significant changes in our management techniques and have noticed an increase in all around quality of life. Previously, keepers had minimal interaction with the goats and if we needed them inside the barn, we baited them in. If we wanted them out of the barn, we went in with a tool and chased them out. We no longer have to do this. Their outdoor exhibit got cleaned only when we could opportunistically lock them all in the barn. Enrichment was seldom given and was typically food related. Enrichment is now a daily occurrence and we have found that they interact with many items. Though we began training with Yahzi and Honovi, the two goats with established human relationships, we started training our third goat Twinkie, once the antecedents were in order and we had proven success. Fellow Aquatics Keeper Courtney Knapp was excited for the opportunity to be her primary trainer and soon we had Twinkie (a goat who was formerly labeled as "scary", "mean" and "skittish") doing show and husbandry behaviors.

Not only do the Rocky Mountain goats participate in a natural behavior show every day, but all three are now hand injection trained and we are working on desensitizing them to tactile stimulation so we can help them with their annual molt. As a team, we also have a goal of doing hoof care without sedation or restraint. Through the process of positive reinforcement training, they are now some of the most reliable shifters in our area and will come into the barn together daily to allow keepers to clean their exhibit and place enrichment in their yard. Gone are the days of chasing goats around with a rake, darting them for vaccinations and wishing they would cooperate.

From Drawing a Blank to Drawing Blood: Training Voluntary Participation in Veterinary Procedures on an Aardvark

Samantha Abrams

Columbus Zoo and Aquarium

Artie, a 9 month old male aardvark, arrived at the Columbus Zoo in 2012 and like all new animals, required a routine veterinary exam before entering into the collection. When it came time to extract blood, veterinarians selected the vein in the ear due to accessibility without anesthesia. Artie is a sound sleeper and we were able to pinch and poke his ear without so much as an eyelid flutter but found that when a needle came near he was up and moving immediately. Veterinarians decided it would not be necessary to anesthetize him to draw blood at that time. In late 2014, keepers noticed he began to look less filled out and his weight started to decrease despite increases in food consumption. A blood draw behavior became first priority and we began training it immediately. After discussions with veterinary staff it was decided that the vein on the inner thigh would be the best place for extracting blood. Now the question became, how could we possibly get access to his inner thigh without anesthesia? Brainstorming lead to a training plan with all approximations to be taken and the construction of an aardvark podium with a small door made from spare screws and scraps of wood. Taking the short amount of time to train Artie to voluntarily expose his leg for a blood draw made it possible for the veterinary staff to give Artie the medical attention that he needed, while at the same time allowing Artie to live a life free of stress.

Introduction

Artie, a 9-month-old male aardvark, arrived at the Columbus Zoo and Aquarium in 2012 destined to be a part of the brand new region, Heart of Africa, which opened in the spring of 2014. Heart of Africa was designed to give zoo guests a real life African safari experience. As guests walk along the boardwalk, they approach exhibits such as lions and the watering hole, which open into a large savanna containing about a dozen different species roaming free. Just like an African watering hole is ever changing with all walks of life coming and going throughout the day and night, our watering hole is a rotating exhibit where several species are shifted in and out throughout the day. At any point, zoo guests could see warthogs grazing, black-backed jackals playing or spotted hyenas roaming and three times a day they can see a cheetah run presentation. In addition to all that, they also get a couple opportunities to experience our aardvark presentation. In the planning stages of the watering hole exhibit, we knew that we were not going to be able to have the aardvarks roaming like the warthogs or hyenas because they would either just curl up and sleep or, more likely than not, dig burrows. Unfortunately, a watering hole full of aardvark burrows is not conducive to cheetah runs. We decided to make the aardvarks' time in the watering hole a presentation and train a behavior to avoid any other undesirable behaviors such as digging. We wanted the behavior to be natural and what's more natural for an aardvark than searching for food? We trained Artie and our other aardvark, Kiazi, to shift to the watering hole on their own and walk with a presenter around the watering hole from station to station while speaking about the aardvark's nightly journey for food. This behavior was a huge success and soon there were zoo guests coming to the watering hole just to see the aardvarks.

Need for Training

As the summer season was winding down with only about a month before The Heart of Africa region would close for the winter, we began to notice some behavioral changes in Artie during his watering

hole walk. It was typical for Artie to wander away from the presenter in search of a good bathroom spot or scratch his back on a truck, but he would always return quickly or was easily refocused. However, Artie began to wander away from his normal path for longer periods of time with increasing difficulty in getting him back on track, even with his favorite treats. Without any obvious signs, we viewed this as a slight breakdown in behavior and made changes to his training plan. These adjustments included changing the direction of his route, using only high value reinforcers instead of his daily diet, having a non-speaking trainer work him, and making his route around the watering hole smaller. Some of these adjustments worked for a short time, but he began refusing his food in the watering hole more often as time went on.

In addition to the behavioral changes, we also began to see body condition changes. Keepers started to notice that he seemed thinner and that his spine was more prominent than we had ever seen in the past. Along with the change in his body condition, he also had a change in his weight. He dropped to around 43.5 kilograms and this low weight remained even after multiple increases in his diet. His weight had been monitored on a monthly basis and being relatively small, his healthy goal weight was between 45 and 46 kilograms. After discussing his symptoms with the veterinary staff, it was decided that drawing blood was a priority in order to see if that could provide any answers. With anesthesia being our last option, we decided to train a voluntary blood draw behavior.

Brainstorming and Preparations

Discussions with the veterinary staff concluded that the best vein to draw blood from Artie was the large vein on the inner thigh. First, we tried was to see if we could draw blood from his leg while sleeping. Aardvarks are very sound sleepers and often sleep on their backs with their legs in the air. This position provided an opportunity for the veterinarian to see if it was possible to draw blood without him waking up. This method proved to be unsuccessful because as soon as the needle touched his leg he curled his body and closed up like a clamshell.

Now the question was: how were we going to get him to voluntarily expose his leg for the blood draw in a way that would make it safe for the veterinarians to move in close to him? We decided to take advantage of a behavior that aardvarks exhibit naturally in the wild. When an aardvark is threatened, they often rear up on their hind legs using their tail to lean on and use their powerful front legs and claws to defend themselves. This knowledge led to the construction of an aardvark "podium" where Artie could stand on his hind legs and brace himself with his front legs while the veterinarian used the small door to access his leg.

The original design of the podium was a rectangular stand with a small door that was made to fit into the doorway of his enclosure, which was beneficial for multiple reasons. Firstly, we wouldn't have to shift or move him anywhere before starting training sessions. We also wanted the podium in his enclosure because it gave him the choice to come up to the podium or leave. The first modification to the podium came in the form of a shield for the veterinarian's head. Because Artie is a considerably messy eater, he would shower food onto the head of whichever vet was attempting to draw his blood. The second modification was the addition of a raised bar at top of the podium in order to make it easier for Artie stabilize himself and stay up longer. Now that we had the podium exactly how we wanted it, training could begin. We chose an avocado blended with water as reinforcement and administered it from a large syringe.

Training the Behavior

The first approximation we took was to ask Artie to come over the podium and see if he would be interested in jumping up on it. I started by leaning over the podium and prompted him by tapping the syringe on the ground and calling for him. I reinforced him for coming closer to the podium each time and eventually asked him to put his front feet on the podium. I would tap the syringe on the top of the podium and reinforce him for putting his feet on it in any capacity. Once he was consistently putting both feet up on the podium every time, I began working on duration. I began by reinforcing him immediately for jumping up and after he received some reinforcement, I removed the syringe for a few seconds while still having it in his view before reinforcing him again.

As I increased the time between reinforcers, I moved the syringe farther back and eventually under the top of the podium so he could not see it. The goal was to remove the syringe completely so he was coming to the podium on a finger tapping cue and not because he saw the syringe, which changed it from a baiting strategy to a reinforcement strategy. The next step was to fade out the bait and add the cue. I did this by presenting the cue and then immediately showing him the syringe. I delayed the time between the cue and the reinforcement gradually, so he would come up onto the podium into the correct position before getting bridged and reinforced. Once he was coming up to the podium on cue and staying for a longer duration without the syringe bait, we were ready to move to the next step.

It was important that his back feet were close enough to the podium so the veterinarian had good visual access to the vein. In order to ask Artie to take steps with his back feet to be closer to the podium, we had to relax criteria and regress by showing him the syringe again. Once up on the podium, I would hold the syringe farther away from him or higher above him, which would prompt him to take a step forward. Once he took any approximation forward with his back feet, I would reinforce. I was able to quickly fade the syringe out and use a cue of pointing my finger at the back of the podium to get him to take a step forward.

With Artie in the right position, it was time to start touching him on his leg where they would eventually draw blood. To do this I would call him onto the podium and once he was in position, I would have a second trainer open the small door to expose his leg. At first, the second trainer would open the door and bridge him with a "good." I would reinforce him as long as he stayed on the podium. We then moved forward by using our finger to apply pressure to the spot on his leg where they would draw blood. The goal was to make the poking of the leg as uncomfortable as possible and have Artie choose to stay on the podium. As long as Artie didn't show any signs of discomfort and would not leave the podium, we would apply more pressure with our finger at each repetition. Eventually, the second trainer was able to push as hard as they could on his leg without reaction, so we knew it was time to move forward. We then moved to poking his leg with a stretched out paperclip to simulate the needle. Just like with our fingers, we had to start out with a light touch, but quickly increased the pressure each time. Within a couple days, the second trainer was applying as much pressure as possible without any reaction from Artie. At this point, we felt that Artie was ready. We made an appointment for the veterinary staff to attempt a blood draw. Their first attempt was successful and they acquired more than enough blood to test for any abnormalities.

Results

After Artie's blood was tested, it was realized that they could not tell if his blood results were normal because there weren't any other aardvark blood samples to compare it to. Since our other aardvark, Kiazi, was seemingly healthy, we decided to train her for the same blood draw behavior. Since we had already worked out the kinks with Artie, Kiazi's training took less time and her blood was drawn successfully. The veterinary staff could now compare Arties and Kiazi's blood together. While we waited for the results, the veterinary staff thought that Artie might benefit from a series of vitamin B injections. We were able to double the voluntary blood draw behavior as a voluntary injection behavior so giving Artie the injections was stress free. When Kiazi's blood test results were returned, it was discovered that Artie had an amino acid (carnitine) deficiency and was prescribed a carnitine supplement, which we will have to give him for the rest of his life. His weight is back to normal, his appetite has returned, and he will hopefully be resuming daily walks around the watering hole this summer.

Training in the Dark

Trelle Dandridge and Heather Samper
Mutts with Manners

A dog trainer who began her career in a zoological setting fortunate to work with a multitude of taxa in mixed-species exhibits doesn't sound that interesting. But try training a dog, or any species for that matter, with the lights off. Seriously. Eyes shut, lights off, pitch black. Will you be as successful? Can you explain what's happening to other people? Can you interpret the body language of a new animal you've never met that has a behavior problem? Trelle lost her vision in 2001 which coincided with landing her dream job at the Aquarium at Moody Gardens, where honing her training skills began. It was an incredible adjustment to say the least. In 2008, she left the aquarium to embark on a new adventure- a business owner. A new career as a dog trainer opened up many doors and Trelle now co-owns three businesses, trains dogs (and people), teaches classes, manages an intern program, and volunteers with three canine non-profit organizations. That's a full plate for anyone! But to do so without the ability to see what she is training, where she is training, or who she is training with is remarkable. How is this possible? Throughout this presentation you will learn various strategies Trelle utilizes to interpret and modify behavior, motivation factors, and specific challenges of training in the dark. Trelle is a constant inspiration to everyone she meets and we wish to share her journey of Breaking Down Barriers with you.

Background

We always think about positioning our animals for success, but what about ourselves? As Trelle found herself faced with the unexpected circumstance of blindness, she also found herself positioned for success in the work place. While at the Aquarium at Moody Gardens, Trelle had curators and co-workers who found creative ways to help her work as independently and safely as possible. From labeling water quality bottles with Braille to unexpectedly being tossed into the one million gallon Caribbean exhibit to ensure a safe escape on her own, everyone worked as a team to provide Trelle with an environment for success.

When Trelle was 13, she was in a car accident and was soon diagnosed with head trauma which later resulted in her complete blindness in June 2001. Attracted to animals from an early age, Trelle had always wanted to work with animals professionally. In fall 2001, she had an opportunity to intern in the Caribbean exhibit at the Aquarium at Moody Gardens which led to a full time biologist position. Trelle could not see when she was an intern or a biologist but her passion to pursue a life-long goal would not be deterred by a minor flaw in her body. She got to work with some amazing animals such as Giant Pacific octopods, sand tiger sharks, a loggerhead sea turtle, and seahorses. She also participated in the animal training program, which included skill tests and hands-on training with section animals. This program honed her training skills, which she would utilize and expand upon later in life.

Seven years later in December of 2008, she made the tough decision to resign from her dream job at the aquarium to embark on a new adventure - training dogs. Sounds kind of lame in comparison to exotic aquatic animals, but what she realized was that this seemingly "dumbed down" taxa of animals was actually a charismatic mega fauna waiting to be discovered. Or in reality, waiting to discover her. Dogs she can touch, sharks not so much. Due to having lost her eyesight, touching an animal allowed her to gather all of the information herself instead of relying on other people to interpret animal behavior for her. That is empowering! Re-discovering herself as a trainer without eyesight became a priority when she got a puppy.

Trelle knew if she could train her puppy, Muri, she could train other dogs and owners. How? By sensing the tension on the leash, the stiffening of the body, a wagging tail, an open panting mouth, etc...

New Beginnings

Two colleagues from Moody Gardens and Trelle started Mutts With Manners in the fall of 2009. The goal for the business was to teach people how to have stronger relationships with their dogs, through positive reinforcement training and enrichment. We began with just private lessons and basic obedience classes. As we grew our programs expanded from basic obedience to common behavior issues such as reactivity, puppyhood, leash walking, and general problem solving. We also developed group classes that would cover certification programs. We even expanded our service locations from Trelle's backyard to a client's residence, a vet clinic, and a pet resort.

Success is contagious. Why have one business when you can have many? As Mutts With Manners overcame obstacles of being a female owned and operated business which was established less than a year after a devastating hurricane on the gulf coast, we slowly gained momentum and our clients began asking us about pet sitting and dog walking. As we pondered this idea of owning and managing another business, we concluded it would be a valuable service to offer and Tail Waggers Pet Sitting and Dog Walking was born. This business provides our community with pet sitters who are CPR/First Aid certified. We hired five employees who pet sit in the owner's home, take dogs for walks, and provide pet taxi services. Trelle manages the schedules of the pet sitters, books new clients, and advertises around the island. Management of these tasks occurs as in any other business- on the computer and smart phone. Trelle has a special program on her laptop and iphone that reads emails and texts to her then allows her to respond back via dictation or typing. This program also works on MS office documents and the internet by reading everything to her. You'd never guess she couldn't see based on how much she accomplishes.

MyTrainingStore.com is an established company that we acquired in spring 2015. This online store provides animal training supplies, training books, as well as enrichment items to zoos, aquariums, and the general public around the world. We house a large inventory and make a few items that are exclusive to the store.

As Trelle transitioned into owning multiple businesses, she found herself once again positioned for success. Surrounded by complimentary partners that have mutual respect and trust, we all quickly found our roles and work within our strengths to enhance each business. We have a passion for giving back to the community and volunteer with three non-profit organizations.

The Galveston Island Humane Society (GIHS) began receiving our training services shortly after Mutts With Manners was established. By volunteering weekly and training dogs for basic obedience behaviors we not only established a positive relationship with the staff but helped make dogs more adoptable. We support GIHS as sponsors for various events throughout the year and they refer us exclusively with every adoption and problem case that is brought to their doorstep.

Pet Partners is the national leader in demonstrating and promoting positive human-animal interactions to improve the physical, emotional, and psychological lives of a variety of people. This organization registers handlers of multiple species as volunteer teams that provide animal-assisted activities. Science has proven that the health benefits from these animal-assisted activities are indisputable. Two years ago, Trelle and Muri became a registered Pet Partner team. Twenty hours have to be completed within 2 years of passing the evaluation to stay active in the Pet Partner program. Muri is an over-achiever and intends to accomplish more than the minimum required hours. Muri is also a shelter ambassador and helps educate children how to approach and pet a dog at scheduled school programs.

There are many worthy veteran programs utilizing dogs to assist in coping with Post Traumatic Stress Disorder (PTSD). In October 2014, Trelle began working with Train A Dog Save A Warrior (TADSAW) which is based out of San Antonio, Texas. The TADSAW program serves the warrior, the family, and the community by providing the warrior with a K-9 rescue "Battle Buddy" and the training and tools needed to become an accredited Warrior/Service Dog Team. If the warrior needs a dog, TADSAW's trainers will go to a rescue

shelter and evaluate and select an appropriate candidate for the warrior. At that time the process will begin. The program lasts from 15-20 weeks to train the warrior and dog team. The first phase is focused on the skills needed to pass the AKC Canine Good Citizenship course, which is the benchmark standard in obedience for therapy dog work. During the second phase, time is spent socializing the team in dog friendly public places. When the trainer is confident the team is progressing sufficiently, the in-training Public Access work, in areas where only Service Dogs are allowed, begins. The team will graduate and become accredited by TADSAW when the Public Access Temperament Test is given and the team passes. (TADSAW, 2010).

This has been a very rewarding program to be a part of in which we get to save a life at the shelter, which in turn saves a veterans life. After the initial meeting with a veteran, Trelle assesses whether their own pet will be able to take on the role of a service dog or whether a new shelter dog will be needed. If another dog is needed, Trelle assesses dogs at GIHS to find a good match for the veteran. Temperament, reactivity, even assessing confidence in real world scenarios are all screened by Trelle before the veteran meets the dog. Together, Trelle and the veteran train the dog in basic obedience, intermediate obedience, and then begin training service tasks related to the veteran's disability. These include behaviors such as 'cover", "brace", aiding the veteran in regaining balance, alerting family members that they need assistance, and more.

The goal of all this training is to transition the veteran back into society with their K9 "battle buddy" helping them manage PTSD. At first, just bonding with the dog helps ease PTSD symptoms tremendously. There are many studies documenting the benefits of caring for and bonding with animals. The veterans reap these benefits as soon as the shelter dog is sent home with them. For example, during a night terror as a veteran wakes up, they can use their dog as a tool to interpret their environment as reality or dream by seeing their dog, feeling their presence, and more quickly transition back to sleep. These effects are felt immediately. Trelle gets to pass on invaluable knowledge about keeping the dog training positive, and how this applies to people as well as society. Trelle's blindness also motivates these veterans to step out of their comfort zone and live life to the fullest. But they are equally inspiring to Trelle!

In the summer 2012, Trelle became a mentor for Animal Behavior College, an online school for dog trainers. To graduate, each student must complete an externship of 15 hours with a mentor in their area. Upon completion of this externship and graduation, students are able to begin building a business on their own. We quickly realized that after the required hours of externship they did not feel ready to start their own business. That bothered us that novice unconfident people are jumping into not just training alone but managing their own business. Could we help? Of course! Mutts With Manners developed a 6 month and 1 year internship for the students to gain more experience in the training world. They attend monthly continuing education classes, teach a basic obedience class, observe the more advanced classes, shadow private lessons with each partner, access a suggested reading list, and assist with some basics of business ownership firsthand such as advertising and posting on social media. The goal was to create a more confident trainer, whose skills we became very familiar with and in the future will be able to network with these like-minded trainers, not see them as competition. After all, they are the next generation of dog trainers and it is fulfilling to know we helped shape them!

Mutts With Manners has remained free of overhead expenses by working at our clients' homes and partnering with local businesses, such as veterinary clinics and boarding facilities. We provide these businesses with professional positive reinforcement training services, which they in turn offer to their clients. The main challenge to not having our own facility is Trelle having to learn to navigate around multiple locations. Although the veterinary clinic and boarding facility remain constant in their layout, everyone's personal home is dynamic. Other challenges for Trelle include transportation to and from these locations, additional people needed to assist in teaching Trelle how to map out each area, and access to personal amenities such as bathrooms and wifi if she will be there for an extended period of time. The more places Trelle trains, the faster it is all logged into her growing memory bank.

Bone Voyage Pet Resort (BVPR) provides Mutts With Manners a climate controlled training room for private lessons and intern meetings. We also utilize the entire facility for training, such as group classes,

board and trains, and temperament evaluations. Galveston Veterinary Clinic is the more rugged location for training because it is outside in a fenced yard with grass, gravel and a concrete pavilion with furniture. What makes this place so challenging is there are no tactile features to alert Trelle to furniture placement or support beam locations. At BVPR there are frequent changes in floor texture, both inside and outside, to alert her to upcoming obstacles. What a great idea!

So by now there is a burning question in your head. Just how does Trelle train? Well, that is easy… magic, of course! In all seriousness, she utilizes the same methods anyone else in the positive reinforcement training world would apply. Shaping, luring, capturing. Working with dogs is the easy part. Trelle is able to detect major and subtle changes in a dog's body language indicating changes in behavior due to her finely tuned sense of hearing and touch. But working with the people is the hard part. She has learned the importance of asking a lot of questions! People do not always offer up every detail. An important part of her job is extracting vital information by asking the right questions to identify a problem and create an effective training plan for the entire family- canine and human.

Trelle makes it a practice to disclose to her clients that she cannot see and makes sure they are prepared ahead of time. Although most people are surprised to hear this, they are extremely willing to participate in training and in assisting Trelle as needed. She teaches clients how to train their own dogs. She accomplishes this by explaining to clients how they are going to achieve success. Next she demonstrates how she wants them to execute the skills. Clients then attempt to train and she gives them pointers to help clarify any behavior. Trelle's goal is to empower clients with knowledge. She wants owners to give their dog enough time to process information without premature owner intervention in the form of physical manipulation, repetition of cues, and/or food bribes.

The internship program has provided Trelle with a supply of interns that allow her to offer a more advanced level of training for clients. Mutts With Manners recommends day care to our clients who are busy professionals. With the assistance of the interns, Trelle can check the dogs out of day care or boarding facility and train in real world environments such as local coffee shops, outdoor restaurants, and stores that are dog friendly. This has sped up the training process for our clients' dogs with behavior issues like reactivity or leash pulling. Our clients achieve quicker results with this unique service. Interns also provide Trelle with environmental and navigation cues and visual feedback on canine behavior and body language throughout the training session.

In conclusion, managing multiple businesses can be challenging but extremely rewarding. The motivation to get up every day and be excited to be a dog trainer and a successful business owner is a conscious, internal choice. This internal choice can apply to anyone. Trelle has never thought of her blindness as a disability, it is just something that is a part of her, like people who are short or have red hair and freckles. You adapt, you don't disengage from life.

Trelle wholeheartedly believes we live in a limitless world. By staying open to possibility, and allowing the gentle yet sometimes forceful encouragement of family, friends, and colleagues, we can do anything. We can live our lives without barriers and without boundaries. Life is too brief to live inside a box- we can escape from the box or stay out of it altogether.

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Changing a Perception: Improving Animal Welfare in Vietnam

Erin Ivory and Georgina Allen

Wild Welfare

Captive wild animal facilities in Vietnam, such as wildlife rescue centers and zoos, are playing an increasingly important role in the conservation of endangered species by enabling the effective confiscation and accommodation of animals caught up in the illegal wildlife trade and through educating the Vietnamese public on the importance of species and habitat conservation. However, where wildlife-holding facilities do exist, it is essential to ensure the best possible care for the animals if such facilities are to engage with, and receive support from, international species conservation programs. Standards to ensure the physical and behavioral well-being of animals must be equal to, or better than, the standards of participating international facilities. Since 2014, we have been working with Hanoi Zoo, Hanoi Wildlife Rescue Center, and the Elephant Conservation Center. These government run facilities were chosen because of their ability to drive change within Vietnam if efforts to improving animal welfare were successful. There are many challenges associated with working in Vietnam including cultural and social differences, facility management structure, and translation. We will explore the challenges, strategies, successes and future initiatives to continue improving the welfare of animals in Vietnam.

Training for Ultrasounds in Xenarthra

Sarah Graham

Busch Gardens Tampa

No studies have been found to document the growth rate and development of a fetus from conception to parturition in xenarthrans. In the three banded armadillo, Tolypeutes matacus, ultrasound cannot penetrate through the shell and therefore the ultrasound probe must be placed on the abdomen. This can be challenging due to the armadillo's ability to curl into a ball. The Linnaeus' two toed sloth, Choloepus didactylus, has unique anatomy in the digestive tract which can hide the reproductive organs when attempting to view using ultrasound. We present two cases where behavioral training has enabled us to obtain fetal ultrasound images in these otherwise challenging species. A pregnant armadillo, "Zowie," was trained to maintain relaxed open body posture so that handlers could position her vertically. This gave veterinary staff perfect access to place the ultrasound wand on her exposed abdomen. A pregnant Linnaeus' two-toed sloth, "Daisy," who had no previous training, was progressively worked with to develop a complex behavior chain. This training included acclimation to handlers, target training, crate training, and desensitization to abdomen tactile for clippers and ultrasound wands. An innovation in sloth management involved creating and utilizing a transportable device from which the sloth can hang while the ultrasound is conducted without the use of anesthesia. When used at the Animal Care Center, our on-display veterinary hospital, this device allows our guests to view the ultrasound procedure and have in depth discussions afterwards with the veterinary professionals.

Prior to ultrasound training, an adult female three banded armadillo *(Tolypeutes matacus)* named "Zowie" had been handled regularly for interactions and presentations in the education department. Like other three banded armadillos, she would instinctively curl into a loose ball when held cupped in hands. After we observed mating activity, we attempted to monitor fetal status using ultrasound. The ultrasound wand could not penetrate through the thick shell of the armadillo and when the ultrasound wand was placed on her abdomen, she would curl into a tight ball and would not permit the medical procedure.

We began training approximations to an assisted vertical position in order to expose the abdomen for ultrasounds. Initially, we would set mealworms or other preferred food items in a pile on a tabletop and place two hands on either side of the armadillo's body. One person would then gently lift the rump end of the armadillo off of the tabletop about 2 cm and set back down on the tabletop (Figure 1). During these training sessions, the armadillo would self-reinforce by consuming mealworms for the entire duration of the

Fig 1 Quarter up

Fig 2 Vertical

session. Using approximations, we increased the distance to 4 cm, until the rump was vertical toward the ceiling and the armadillo's head remained facing downward almost at tabletop level (Figure 2).

The next step in training the ultrasound was to increase the duration that Zowie could be held in the vertical position. We started by gradually increasing the length of time when her body was approximately halfway vertical. Eventually, we worked towards increasing duration at higher rump positions until her body was vertical.

Once comfortable with the vertical position, we began to have staff members place pressure on her lower abdomen with two fingers and then with a wooden dowel made to resemble an ultrasound wand (Figure 3). After using the actual ultrasound wand for the first time, we realized the wand was too large for her small size, as her feet and legs were where the wand needed to be placed. To accommodate the size and positioning of the wand, we held the armadillo's legs slightly apart once in the vertical position (Figure 4). This completed behavior easily translated to the exam tabletop at our facility's animal hospital where the general public could observe this ultrasound procedure weekly (Figure 5). Training these ultrasound behaviors in a three banded armadillo enabled us to monitor the fetus and measure the growth rate during gestation (Figure 6).

Fig 3 Fake wand

Fig 4 Vertical leg hold

Fig 5

Fig 6 Newborn

The Linnaeus' two toed sloth (*Choloepus didactylus),* named "Daisy", Regional Studbook #801, arrived at Busch Gardens at approximately 4 years of age in 2012 with unknown previous training and limited socialization. In the first phase of her training we focused on learning about her preferred items, gaining her trust, and teaching her how to shift around the habitat for basic husbandry. We started by hand feeding her different food items and quickly discovered she preferred green pepper, sweet potato, pear, apple, mango, and hardboiled egg. To make these preferred items more valuable, we offered a few preferred items on a rotating schedule and would only offer them by hand to encourage contact. The non-preferred food items were offered on a tray for free feeding at any time.

To introduce the bridge, we fed the preferred items while saying the word "*Good*" in a quick, high pitched, "happy" tone. During the next portion of the sloth training, we introduced the target behavior. This behavior has a visual S^D of the finger portion of a hand opened flat in an upright position to the sloth's

nose while giving the verbal S^D "*Target*". Upon contact, we immediately bridged and fed preferred primary reinforcement in a 1:1 ratio. Next, we held the hand at 1 cm in front of her nose, and upon the sloth touching her nose to the hand, we bridged and reinforced using a 1:1 ratio (Figure 7). Using approximations, we increased this distance to 4 cm, and can now ask the sloth to move up to 1 m distances with each S^D. The bridge is not a terminating bridge and will be utilized if the sloth traverses a particularly difficult area or moves at a pace quicker than usual. The reinforcement schedule is often 1:1 ratio due to the length of time it takes to complete the behavior. The open hand presented in front of her is the S^D for the sloth to complete the target behavior. The S^D verbal "target" is more for the benefit of the humans observing the interaction.

Fig 7 Sloth target

The second phase of the sloth training concentrated on behaviors that would enable Daisy to become an education ambassador. We started by utilizing the "target" behavior to shift her into a crate. The crate had been modified with two wooden dowels affixed near the top for the sloth to use as branches to climb (Figure 8). The crate behavior was first taught with the door removed then with the door present. In both cases, entry into the crate would be reinforced heavily with primary preferred items. Because the initial crating was so heavily reinforced, the sloth would often wait in the crate for more reinforcement to the point of falling asleep, so the trainers used the target behavior to move her out of the crate. The use of the target behavior was phased out for both the crating and uncrating, and the S^D became the open crate door.

For guests to see the sloth up close, we trained her to come out of the crate and climb up a specially created presentation tree (Figure 9). We would reinforce her on a variable reinforcement schedule once she reached the top of the tree and for duration in the tree. Once the crate was presented to her on the ground with the door open, she would climb down and return to the crate. The trainers also began to desensitize Daisy to touching various places on her back and sides, much like a guest would.

Mating behavior was observed by the trainers in mid-April 2015 when Daisy was approximately 7 years old and the male Regional Studbook #574 was approximately 10 years old. The third phase of Daisy's training focused on preparing for monthly ultrasounds at the animal hospital. The large amount of hair on her abdomen proved problematic for the ultrasound machine. Trainers desensitized her to the sound and feel of clippers using preferred primary reinforcement with minimal difficulty. Due to the previous tactile training, tactile

Fig 8 Sloth in crate

Fig 9 Tree

contact on the sides of the abdomen with increasing pressure was trained in a relatively short time span. No S^D was used for this behavior and the primary preferred reinforcement schedule was continuous in the beginning and then reduced to being frequently reinforced. The transition from hands to the ultrasound wand was seamless and the sloth did not appear to notice the difference. The trainers and vet staff attempted to use the presentation tree initially for ultrasounds, but positioning did not yield adequate ultrasound images.

Fig 10 Slothie bars

Fig 11 Out of crate

Fig 12 Vet Sloth Trainer

After ultrasound images confirmed pregnancy approximately 3 months after mating activity, ultrasounds were scheduled weekly to monitor the growth rate and health of the fetus. To expedite the process of positioning the sloth for the ultrasounds, I developed a device called "slothie bars" which resembled "monkey bars" found on playgrounds. The slothie bars were constructed from PVC board and wooden dowels. The slothie bars dimensions were developed to accommodate the height of the sloth while comfortably hanging, allow the crate door to open and shut without interference, and for both the crate and the slothie bars to fit on the exam table (Figure 10). Trainers targeted Daisy out of the crate onto the bars, and the bridge and primary reinforcement were given for every foot that grabbed the wood beams (Figure 11). The sloth would remain relatively still on the slothie bars, which allowed more time for ultrasounds than while on the tree (Figure 12). Two trainers would also be able to lift the sloth bars with Daisy the sloth hanging on the device and move from the exam room to the x-ray room and back. Another trainer would give reinforcement for the duration of the travel time for staying still on the slothie bars. The x-ray machine allows horizontal imaging (with the plate held upright) and the trainers would set the slothie bars next to the x-ray

Fig 13 Xray room

Fig 14 100715 Ultrasound labeled

plate so the sloth was in the proper field (Figure 13). The trainers were able to manipulate the feet and leg position of the sloth to move her to the closest part of the slothie bars to the x-ray plate. Upon return to the exam table, the crate would be presented with door open at one end of the slothie bars to give the S^D for the sloth to crate. Training these ultrasound behaviors enabled us to monitor the fetus and measure the growth rate during the 50-week gestation (Figure 14) (Figure 15).

By training the armadillo and sloth, we were able to get detailed images and measurements of their fetuses throughout their pregnancies in a non-invasive way that did not require anesthesia (Figure 16).

Fig 15 032716 Xray labeled

Fig 16 Baby pic

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Breaking down Classic Animal Care Roles to Find a Common Ground to Care for an Okapi (*Okapia johnstoni*) with a Difficult Injury

Scott Trauger and Lauren Smith, DVM;
Natural Encounters, Inc. and Tampa's Lowry Park

In 2012, Tampa's Lowry Park Zoo was home to 1.1 Okapi (Okapia johnstoni). One morning, upon the staff's visual check after arrival to work, it was noticed that the male okapi, Zach, had done damage to his front right hoof. Our Animal Care and Veterinary teams exhausted all possibilities of treatment to allow the hoof to heal. When progress wasn't happening as we had hoped, it was decided that the best course of action was to amputate one half of this hoof. The question then became, how do we allow this animal to have the best quality of life with this new physical change? Over the next few years of care, our staff realized that it takes a combined effort from a husbandry, veterinary, and behavior management perspective to truly give this animal the best possible quality of life. This is the tale about how we, as Animal Care staff, regardless of title, must figure out how to mesh our roles for the betterment of our animal's life.

What you are about to read is a unique perspective about the blurring of titles in the animal field. Often times, people in this field classify themselves as either Animal Care, Animal Trainers, Veterinary Keepers, Veterinary Technicians, Quarantine Specialists, or some other title not listed here. At Tampa's Lowry Park Zoo, people are hired into their positions with titles, but they quickly find out that if they are looking at performing the best in animal welfare for their given animals, they must both adapt to all of these roles, as well as lean on and trust others with their expertise on the matters they may find themselves weaker in. In order to properly care for their animals, egos must be checked at the door when they arrive. This story truly illustrates how both of these mindsets can create the epitome of animal welfare.

Our story begins late in 2012 with a male Okapi named Zach who resides at Tampa's Lowry Park Zoo. One morning, while the animal care staff was performing their morning checks on their assigned areas, they saw that Zach appeared to be showing a weakness on his front right hoof. The official medical diagnosis was that he had acute onset thoracic non-weight bearing limb lameness.

Our first task was to determine the extent of the damage, so we turned to radiology. Radiographs showed soft tissue swelling overlying the first row of carpal bones. The decision was made to treat Zach in the most minimally intrusive methods possible. He was conservatively managed with bandaging, non-steroidal anti-inflammatories, and stall rest. Unfortunately, there was little improvement and the lameness remained.

On 11 February 2013, radiographs revealed mineralized collateral ligaments between P2/P3 of the lateral digit. They also revealed that the swelling was over the hoof wall. In the medical field, this is known as periosteal exostosis, which in non-medical speak is defined as a benign bony growth projecting outward from a bone surface. Because Zach did not clinically improve, it was determined the best course of action would be surgery.

The surgery was scheduled for 21 February 2013. Zach was brought into the surgery suite, intubated, and placed on isoflurane. During the surgery, the veterinary staff removed osteophytes and the bony exostosis. This surgery went very soundly.

In the following months, radiographs were taken to determine the success of the surgery. About 2 months later, on 2 April 2013, it appeared that bony exostosis might be reoccurring. Around 5 months after the first surgery, on 19 July 2013, radiographs revealed a recurrence of severe bony exostosis bridging the proximal interphalangeal joint.

This brought us to a dilemma. What would be our next step? The facts were: Zach remained lame, there were growing concerns for the quality of life, but he also remained valuable as his genes were vital to the managed population of a severely depleted SSP animal. Ultimately, the veterinary, curatorial staff, and animal keepers set a goal for Zach: to provide higher welfare standards while maintaining opportunities for breeding. After some research, it was determined the best chance of succeeding with this goal was a different type of surgery-digital amputation.

Digital amputation has been used in large animal medicine for over 50 years. In parallel with our own animal injury, lameness ranks as the third reason for culling in the general dairy cow population. Depending on the clinical presentation and location of the disease, there are a variety of surgical options available to address diseases of the claw, some of which include arthrotomy and digital amputation, with up to 90% of cases involving disease with the claws. New claw diseases frequently occur in the contralateral limb. At the same time, new claw diseases rank as the most common reason lame cattle are culled following surgical correction. Ultimately, though, this method presented an alternative to culling in cattle, and likewise presented a suitable way to treat Zach, as well.

There was significant data to support the potential for success. The mean survival time was 13.5 to 20 months after digital amputation surgery in dairy cows (Meyer-Buchtien 1971; Funk 1977; Güller and Martig 1977, Ziffer 1980; Kofler 1991; Pejsa et al 1993; Heppelmann 2004). The mean survival time was 27.2 months in breeding bulls (Kofler et al. 2007). The successful outcome was dependent on case selection, surgical aseptic preparation and technique, removal of diseased bone, and lavage (Zulauf et al., 2001; Nuss, 2004b).

Our surgical plan was such: The digital amputation site location was chosen on the proximal interphalangeal joint. Since septic arthritis can occur in dairy cattle, high digital amputation is recommended as this increases the likelihood of removing all diseased bone and tissue. Additionally, sinking of the remaining claw heel (low heel) is a common consequence to low digital amputation, and the high amputation technique may help avoid ground contact of the stump, which can be painful (Kofler and Fessel 1989; Nuss 2004b, Kofler at al. 2007; Heppelmann et al. 2009). Our concerns post-operative were infection, sinking of the partner claw, and disease of the remaining claw (Starke et al. 2007 reported a 30.7% incidence).

Surgery was performed on 2 August 2013. Zach was immobilized in the alleyway in the barn complex. He was mildly excited a few moments after the induction dose, and fell backwards on his right side where he remained for the duration of the procedure. Detomidine/butorphanol were used pre-med; Carfentanyl induction IM (hand-injection) and a 14g jugular catheter was placed in his right jugular vein. Throughout the procedure, his heart rate, temperature, and respiratory rates were monitored. Standard surgical prep was performed. The claw and interdigital space were cleared of substrate, fecal material, and debris. The area was surgically prepared with alternating scrubs of alcohol and betadine solution. A regional ring block 12ml 2% lidocaine was given. A tourniquet was placed above the carpus (basically similar to human wrist location). A vertical incision was made through the skin and underlying SQ with a #22 blade over the axial dorsal surface, and continued laterally and caudally along the coronary band to meet with another vertical incision on the plantar aspect of the hoof (Basically, the cut was made over the central top area of the hoof, and continued along the side and towards the back along the area where the soft skin that the hoof grows from, to meet with another vertical incision on the bottom of the hoof). The closure was a 2-0 PDS (polydiox-

anone material), simple continuous suture. "Blood stop" powder was placed over the exposed area, and the foot was wrapped to the carpus with bandage material. Post-operative radiographs taken immediately following the procedure revealed adequate removal of the diseased bone (P2 and P3). The following were used as injections and to aid in reversal: 2 L of LRS IV, Amikacin (14mg/kg) IV, Combi-Pen SQ (50,000mg/kg), Ceftiofur (6.6mg/kg) IM, Ketoprofen (2mg/kg) SQ, reversal with Naltrexone IM/IV (50:50). A full blood panel run during surgery revealed levels in the normal range. Zach recovered relatively smoothly, but was very unsteady on the affected limb immediately after standing.

Healing was by second intention. This meant the wound was left open and healing occurred by granulation tissue formation, contraction of the wound edges and subsequently epithelialization (becoming covered by epithelium or thin tissue). These wounds showed delayed healing due to the volume of connective tissue required to fill the defect. Since there is no epidermal barrier, the risk of an infection is significantly higher in these wounds. A purulent discharge was noted during post-operative management. Enroflaxcin was added to his post-operative management to prevent any possible bacterial infections. Complete closure is contraindicated in cases where severe inflammation is present (Nuss 2004b). Initially, the idea was to wrap the hoof. Zach didn't tolerate the wrap so he was left on soft substrate. When he was monitored in the following months, it was noted that he had pink, healthy soft tissue and no additional discharge.

A big component of Zach's post-operative care was the care of his hooves. Previous to this medical challenge, Zach would get anesthesia based hoof trims. There is always an inherent risk anytime anesthesia is used, so we sought out alternative methods. Upon talking to the Associate Curator of the zoo, it was determined we could attempt to train voluntary hoof trims utilizing operant conditioning techniques.

The first step of any good training is to think about what you want the behavior to look like and develop a plan. What will be the criteria? In this case, we decided the front hooves and the back hooves would be done slightly differently in order to achieve the greatest chance of success with Zach. The Director of Medical Sciences was sought out to ask exactly what should be done and how we could safely attempt this task. This collaborative effort led to an extensive training plan for the overall well-being and medical care of Zach.

We couldn't just jump right into hoof trims, so it was determined that a full course plan would be developed to achieve the greatest success. This is the plan that was presented and approved:

1.1 **Okapi Zach Training Plan**

Primary Trainer: Scott Trauger

Secondary: Robyn Jackson

First Steps/Goals:

1. Build the Relationship
2. Determine Motivation
    a. Primary Reinforcers
        i. Sweet Potato
        ii. Carrot
        iii. Romaine
        iv. Specialty Browse
3. Establish the Bridge – whistle
4. Determine Focus
    a. Does he walk away?
    b. Is he distracted by outside stimuli in session (other people, animals, sounds, etc.)?

c. Any behaviors that might be associated with aggression (kicking, tail swatting, etc.)?

5. Establish Boundaries for Sessions

a. Sessions should be anywhere animal can go (habitat, holdings, and barn)

b. Determine focus for each session (if timeout or re-directs are not successful, try session later in day-animal dictates motivation)

Behaviors

Nose Target

Criteria: Animal calmly touches nose to the end of a target pole and holds position until released.
Tools Needed: Target Pole – 12 in. acrylic pole with green ball at end.

1. Desensitize to the pole

a. Have the pole at my side and reinforce stationing

b. Hold pole in my hand and reinforce no reaction

2. Touch pole to nose, say verbal S^d "Target" and reinforce

3. Approximate target pole away from nose and continue verbal and reinforce for him touching it.

4. Target the animal to different locations and reinforce for targeting properly

5. Slowly increase duration for animal touching the pole

Tongue Present

Criteria: Animal calmly wraps tongue around the end of the target pole.
Tools Needed: Target Pole – 12 in. acrylic pole with green ball at end.

1. Use baiting strategy (food in hand) and place food hand next to end of target pole, say verbal S^d "Tongue" and when he starts to reach out tongue toward hand, bridge and reinforce.

2. Approximate grasping around food hand and target pole with tongue while continuing to use verbal S^d and baiting.

3. Phase out food hand and continue only verbal S^d to solicit behavior. Bridge and reward for wrapping tongue around green ball.

Voluntary Hoof Trims (Front)

Criteria: Animal calmly picks up front hoof as indicated by trainer and sets it down on block with the bottom of the hoof facing upward and allow 2nd trainer to trim hoof with equipment.
Tools Needed: Target Pole – 12 in. acrylic pole with green ball at end, large (both hooves) block wrapped with firehose.

1. Desensitize to touching the leg with the target pole

a. Have the pole at my side and reinforce stationing

b. Hold pole in my hand and reinforce no reaction

c. Touch gently on back of leg with target pole, reinforce for calm demeanor.

d. Approximate to hoof area.

2. Gently touch target pole on hoof and say verbal Sd "Foot". Bridge and reinforce for any lifting of foot (be careful not to reinforce sideways lifts: i.e. kicks)

3. Approximate longer length of time for holding foot up before bridging and reinforcing.

4. Introduce second trainer into the stall holding the block for proper foot (left or right).

5. Approximate trainer toward position next to leg of proper foot block.

6. Trainer 1(T1) asks for foot lift and Trainer 2(T2) guides the foot to correct position on block. T1 reinforces for allowing touching of leg to block (very short reps.)

7. Approximate length of time animal will rest leg on block.

8. T2 start manipulating hoof with hand. T1 reinforces throughout this process. Terminal bridge (whistle) allows T2 to guide leg off block and T1 reinforces appropriately.

9. Introduce touching of hoof with trimming tools using same step as above.

10. Trim hoof using step 8 with the trimming tools.

<u>Voluntary Hoof Trims (Back)</u>
Criteria: Animal calmly picks up back hoof as indicated by trainer and sets it down on block with the bottom of the hoof on the block with front of hoof hanging off the front of block to allow 2nd trainer to trim hoof with equipment.

Tools Needed: Target Pole – 12 in. acrylic pole with green ball at end, small (both hooves) block wrapped with firehose.
Repeat Steps 1-10 above.

<u>Voluntary Blood Draw</u>
1. Desensitize to trainer touching ear. Use verbal Sd "Ear" and reinforce just for allowing initial contact (be careful not to reinforce head throwing, kicking, or ear flapping).

2. Approximate longer length of time for ear manipulation.

3. Introduce cupping of ear. Bridge for allowing short durations at first.

4. Approximate longer durations of cupping ear.

5. Introduce T2 into stall. Continue same verbal for cupping the ear, but T2 will say "touching" when they are going to start moving around on the ear.

6. Introduce paper clip poke with extremely light pressure (just a touch at first) on ear vein. T2 say "sticking" before touching ear with paperclip.

7. T2 to increase pressure of poke through approximations.

8. Introduce needle to ear.

Through this plan, we were able to begin a proactive hoof trimming program (instead of being reactive), and we continue to utilize this technique today. We realized many benefits as well. We are able to edu-

cate the public about teamwork with our Veterinary and Animal Care staffs both in live talks, demonstrations on habitat, and graphics throughout the zoo. We are able to utilize basic components of training to assist in animal cooperation with medical procedures and shifting-although other competing reinforcers on habitat can still make it hard to shift at times.

From a medical standpoint, our goal was to provide higher welfare standards while maintaining opportunities for breeding. We learned that a limb salvage procedure can be adapted from domestic livestock

to exotic endangered species. From an animal care standpoint, we were able to empower an animal to help in its own welfare. We could now provide all forms of enrichment to this animal, which included allowing him the ability to breed. Furthermore, we could use these techniques in graphics and demonstrations to inspire zoo guests to conserve our planet.

We also learned that what were previously thought of as two vastly different views, medical and animal care based, are really just labels. Both perspectives combined to allow the right set of circumstances for the ultimate welfare of this animal. When that happens, new possibilities are endless! The proof has materialized. Zach is successfully living a fully enriched and empowered life and has met the ultimate goal for saving this species-creating new life to further the story of these unique animals. On 26 September, 2015,

his breeding partner Betty gave birth to Bakari. Bakari is the Swahili word for "promising" and it was fitting. The average gestation for an okapi is 15 months, which meant the breeding occurred post digital amputation surgery.

Truly, this is the direction we hope the animal field will take. Yes, people have jobs and titles, but ultimately, regardless of labels, it is about the animal in our care. How can we best manage their care for the betterment of their own lives? The story of Zach is as good a place as any to start.

Won't They Fly Away? Environmental and Training Foundations that Produces Successful Free Flying Parrots

Chris Shank

Cockatoo Downs

Training a parrot for free flight traditionally requires the use of weight management along with other training tools to create desired training responses from the parrot. However, for over 30 years I have trained a variety of species of my companion cockatoos to successfully free fly without using weight management. I currently fly seven cockatoos of various ages, both parent raised and hand raised. They fly free each day and have been trained to return to their aviaries on cue. By design the daily flying schedule is neither highly structured nor routine. Their free flying experiences consist of self-chosen activities such as foraging, flock flying, playing, exploring, and, occasionally, even predator evasion. They may choose to spend time with me or other human companions. They are eager participants in any training sessions that I offer during their time out flying or while in their aviaries. They are routinely used as willing subjects for attendees to train at our yearly Positive Parrot Training Retreat. This presentation, through videos and photos, will underscore the importance of creating training strategies meshed with an environmental, social, and diet program which culminate in producing confident, fit, eager, and successful free flying parrots without using weight management.

Cockatoo Downs is a parrot educational facility created to teach people how to train and live successfully with their companion parrots through daylong training workshops, weeklong retreats, and, in conjunction with the local humane society, 4 hour long training camps for children. Thirteen cockatoos, who are my companion birds, reside at Cockatoo Downs. The cockatoos participate in training demonstrations as well as hands-on teaching by both adults and children who come to the facility.

For 35 years the variety of cockatoo species I have lived with have been trained to free fly. The training skills I use with my birds have improved over the years for which the cockatoos are thankful. However, the factors used to support the training have changed very little for the simple fact that they are effective in motivating the cockatoos to develop into successful free flying birds.

Currently eight cockatoos free fly at Cockatoo Downs. The group consists of hand-raised birds, parent-raised birds, a wild-caught bird, and a mature companion cockatoo who had been kept in a home setting. Species include Philippine cockatoos, bare-eyed cockatoos, and one Goffin's cockatoo. Ages range from 45 years to 8 years with both males and females.

The environment in western Oregon where we live and where the birds fly is rural with some trees, open land, and a creek. The property is surrounded by farmland as well as a scattering of homes. It is good for free flying parrots as it allows an open view which is especially valuable for predator detection.

All the flyers are released at the same time once a day or even multiple times per day, for as long as 3 hours or as little as 10 minutes depending on schedules. If there are no workshops scheduled, the birds are released to liberty fly while I am out working on the property. They fly in various weather conditions including snow, rain, wind, cold, heat, and, of course, pleasant weather.

INFLUENCING MOTIVATION

Influencing motivation to support and maintain successful training consists of a variety of factors such as housing, diet, natural behaviors, fitness, and training. It is important to note that not one motivating

factor is more crucial than another. However, when taken as a whole there is nothing more powerful in helping the student cockatoo become successful and remain so during his training career. With that in mind, the following factors that influence motivation will be discussed in no order of importance.

HOUSING

To support the goal of training success, a high standard of care with special attention to the welfare of the birds, has been established. A constructional approach to the cockatoos' welfare is used. This consists of giving the bird's control of and choices in their environment which includes their housing.

It's important that captive parrots are comfortable, secure, and content in their environmental setting. To accomplish this, the cockatoos live in large outdoor flight aviaries that are attached to a barn. The birds have full-choice access to enter or exit the barn through windows in the aviaries. The windows connect to large suspended cages which hold their diet and water and where they may roost at night, if they so choose. During the winter, electric warm perches and heat panels are available as well as a pellet stove for general heat.

The outside aviaries offer the cockatoos choices in foraging opportunities in the form of planted seed grasses and grains, as well as access to foraging toys. The aviaries allow for plenty of flight exercise. Natural light is important for the health of the birds and the aviaries are situated so that sunlight fills them throughout the day. Of course, living in western Oregon, rain is available for bird showers almost on a daily basis. There is a shower system used during summer when rain is infrequent.

The aviaries are arranged so that the birds have choices in their social interactions. Being cockatoos, some do not play well with others and these birds are housed with friends of their choice in separate aviaries. All the aviaries are clustered together creating a flock-like atmosphere.

DIET

It is essential that all the birds, especially the flyers because of their high caloric needs, receive a full, rich, and healthy diet. The birds have access to Harrison's pellets throughout the day. Dinner consists of sprout mix, nuts, Avicakes, Nutriberries, and homemade bread. This meal is left in their cages overnight and taken out in the morning. The amount of food is restricted only by how much they eat without wasting the majority of it. In no way does the quantity of food each bird receives depend on his or her performance during training. They all have free choice and free access to their food regardless of the training schedule. High value food treats such as pine nuts and sunflower seeds are kept out of the main diet and used only for training.

TRAINING

Throughout history, trainers have depended on a variety of coercive methods to motivate animals to learn and perform desired behaviors. There seems to be no limit to the diversity of aversive equipment and techniques used in animal training. However, positive reinforcement is the cornerstone of the training practiced at Cockatoo Downs. In fact, it's hard to imagine any other training quadrant being used with flying birds. After all, they can vote with their wings. Because of the positive reinforcement training the birds receive, trusting relationships between the teacher and learner develop. The birds' trust in familiar trainers carries over to people who are unfamiliar to them. This is exemplified by the fact that the cockatoos readily interact with and work for unfamiliar people who come to the facility.

Training schedules are random. There are formal sessions such as working on specific goal behaviors, or informal and spontaneous sessions such as asking for simple recalls while the cockatoos are out for recreational flight. Engaging the birds in training both formally and informally helps retain a trusting,

favorable partnership between learner and teacher as well as keeping learned behaviors and skills strong.

Interactivity between the teacher and student is a key to a successful training program. However, interactivity does not always have to include training. Just being with the birds while I'm working on the property offers plenty of entertainment for the cockatoos as they watch or even participate in my work. This develops a camaraderie between us even though the help they offer usually makes for longer project completion. No matter as the rewards of being together far outweigh any work schedules.

NATURAL BEHAVIORS

Another component influencing motivation that helps create successful free flying cockatoos is the opportunity to express their natural behaviors. There is no limit to the natural behaviors they can and do perform while out flying. The outdoor habitat is full of novelty and stimulation. The adaptations the flying cockatoos must make to the constantly changing environment develop learning skills, coordination, fitness, and confidence. The development and expansion of these skills creates trust and confidence in their abilities to handle whatever conditions occur. This confidence transfers easily with the cockatoos' willingness to participate in any out-of-the-ordinary training goals the teacher puts forth.

The opportunity to express their natural behaviors while out flying comes with a hitch, however. Springtime at Cockatoo Downs brings on the inevitable desire for the cockatoos to raise families which manifests in nest cavity searching. It's a chaotic time. Flight time is fraught with cockatoo angst as they search for and argue over nest cavities found on or off the property. Formerly good relationships can sour as territory boundaries are determined. Recall response plummets as the normally sought after pine nut or sunflower seed reinforcers pale in comparison with the reinforcement that searching for nest cavities provides. Some birds can stay off property for hours at a time and it's primarily for this reason that management is put into place. The birds are put on lockdown and are kept in their aviaries for at least 2 months or until the breeding urges pass.

Staying full-time in the aviaries certainly does not extinguish their desire to start families. However, successful training sessions are still conducted in the aviaries helping relationships between me and the cockatoos remain strong during this topsy-turvy time of year.

SOCIAL INTERACTION

The cockatoos have the choice with whom to interact. As mentioned, some birds do not get along with others. This can be especially problematic when confined, in which case housing management is necessary to keep the peace. When the cockatoos are out flying together, however, management is rarely needed as the birds are capable of handling their own cantankerous relationships by simply flying away. This capability adds still more choice, empowerment, and decision making in the birds' daily lives.

Regardless of the animosity between some birds, when danger is noted by one or many cockatoos during free flight sessions, all the birds react as one unified flock. They take off in flight together to spend many minutes circling overhead determining the source of the threat. Behaving as a cohesive group under these circumstances seems to inhibit an individual bird flying in panic out of the home territory when frightened thus minimizing the possibility of loss.

NOVELTY

The outside environment exposes the cockatoos to a tremendous amount of novel situations, of course, and that exposure certainly helps develop a well-rounded, adaptable bird. Also, there is no shortage to the number of man-made novelties the cockatoos are attracted to. For example, the house is used as a chew toy, the garden tractor provides fun rides, my truck is a fun ride *and* a chew toy, and whatever task I am working on is a never ending source of curiosity for the cockatoos. I seem to inadvertently provide them

lots of entertainment.

Although their involvement with my work and chewing on items that shouldn't be chewed on can be annoying at times, it does add to the cockatoos' seemingly endless list of events, happenings, objects, and animals that they become accustomed to and which, in turn, cause them little worry or stress. These interactions help build a resilient and tractable cockatoo.

FITNESS

Physical fitness is yet another factor that is necessary in motivating the cockatoos. An unfit bird is a bird not motivated to fly. Two components help develop the fitness level of the birds. One is housing. As mentioned, the aviaries offer sufficient room for the birds to exercise and they take full advantage of the space on a daily basis.

Second, before a cockatoo is transitioned to fly outside, her fitness is evaluated and steps are taken to increase her flight strength with trained exercises. For example, one exercise is flying from the ground up to the trainer's hand. Another might be repeatedly flying down to the trainer's hand. These exercises improve her athleticism and muscle strength.

Once flying outside, the new flyer's sessions are kept short with practiced recalls and more strength exercises. These sessions are gradually lengthened. As fitness level improves, she then flies with the others and that's where rapid advancement in her fitness condition occurs.

WHAT MOTIVATES ME?

I am privileged that the cockatoos include me in their daily flying by checking in to see what's happening or by just staying near me as I relax and enjoy the day. This reinforces my belief that the care, training, and welfare I provide fulfill their needs in a captive situation. Observing their natural behaviors helps my teaching by learning what the birds are capable of and, with that information, imagining the possibilities of new behaviors to teach.

Living and working with free flying cockatoos provides me an immense amount of pleasure along with insight into what makes them tick. It is endlessly fascinating watching them fly effortlessly and interact with the environment at Cockatoo Downs. In short, their intelligence, uniqueness, and beauty humble me; and, yes, I regard them as my equals and I am motivated to care for them as such.

Is it a coincidence that good welfare combined with ethical training practices produce thriving, successful free flying parrots? Absolutely not. We must always place the quality of life of our companion and performing animals at the top of the list. Not only is that the morally and ethically correct thing to do, it also generates a life style in which all our animals flourish in their training careers.

Voluntary Net Entry for Lemur Husbandry and Medical Care

Chelsea Feast

The Maryland Zoo

Voluntary net entry has become an extremely useful trained behavior that we established with all lemurs housed at The Maryland Zoo in Baltimore. It is specifically vital for our female ring-tailed lemur, "Fern", who is housed with her father and requires birth control injections every 42 days during breeding season. Previously, she would be kenneled in the outdoor exhibit, transported indoors, restrained using the net to receive the injection, then placed back into the kennel and transported back to the outdoor exhibit. This method added stress to the injection due to separation and transport, which we eliminated using this new approach. Voluntary net entry was established through small approximations using positive reinforcement training. She is now desensitized to the net and voluntarily walks into the back of the bag, the net is closed. She is restrained and receives the injection quickly, then is immediately released. Not only is voluntary net entry a great tool to simply decrease negative associations with the net, it is a quickly trained behavior that allows for injections to be done in a controlled setting. To date, we have successfully given "Fern" two birth control injections using this method. I am eager to share how this behavior was trained, challenges that arose, how this training translates into any exhibit or holding space, the benefits we have seen since starting this training program, and other training alternatives we are currently working to establish.

Animal care professionals, develop a habit of improvement and innovation in which species are cared for. Increasing animal welfare through exhibit design, diet, enrichment, human-animal interactions, social group formations, and training, are all proven tools for accomplishing this task. They are also those which have been used by zoos and aquaria worldwide to accomplish the most daunting or impossible of animal care tasks. The Maryland Zoo in Baltimore (MZiB) is one such zoo. Founded in 1876, MZiB is an AZA accredited facility and the third oldest zoo in the United States. The MZiB houses around 200 species, seven of which are primate species: chimpanzees (*Pan troglodytes*), ring-tailed lemurs (*Lemur catta*), red-ruffed lemurs (*Varecia rubra*), Coquerel's sifaka (*Propithecus coquereli*), black and white colobus monkeys (*Colobus guereza*), lion-tailed (*Macaca silenus*), and northern pig-tailed (*Macaca leonina*) macaques. This paper discusses the development, implementation, and benefits of a novel training program utilized by MZiB staff as an integral part of the institution's lemur husbandry program--voluntary net entry.

Traditional Methodology

The voluntary net entry program was initially created for a specific lemur, the MZiB's female *L. catta*, "Fern". Fern came to the zoo from the Duke Lemur Center (DLC) in Durham, NC, along with her sire. The two are housed and maintained as a social pair, however, they do not have a breeding recommendation from the Prosimian Taxon Advisory Group (TAG) or corresponding Species Survival Plan (SSP). The *L. catta* breeding season typically begins in October with a female cycling up to three times each season. Therefore, Fern receives a contraceptive injection for a total of six doses per year, adapted from recommendations by DLC and the AZA Contraception Center (personal communication, March 26, 2016). By adhering to this protocol, MZiB is able to decrease the chances of an unintended pregnancy, minimize the level of synthetic hormones to which the female is being exposed, and reduce the risk of endometrial hyperplasia which can result from administering a contraceptive continuously/year round (personal communication, March 26, 2016). The old methodology for administering Fern's injection was complicated, potentially stressful to the animal, time

consuming, and could benefit from revision.

Traditionally, Fern's injections involved capture and restraint tools, separation from her companion, two instances of animal transportation, and a minimum of fifteen minutes to complete. The process began by separating Fern from her sire using a voluntary kenneling behavior. Once secured inside the kennel, Fern would be transported indoors, moved from the kennel into a net, hand-restrained while inside the net, given the injection by a veterinary technician, then placed back into the kennel, and transported back to her exhibit. Each time, Fern exhibited significant regression during training sessions following an injection, and would have stress-induced defecation and urination throughout the injection process. This routine also made the kennel an aversive environmental stimuli, decreasing her willingness and reliability with the voluntary kenneling behavior on its own, and even negatively affected the level of trust that was established between her and animal care staff. Avoidance of keepers and an unwillingness to participate in training sessions altogether were the types of behaviors exhibited following an injection.

New Methodology

An alternative method to the kennel and catch-up described above was the voluntary net entry training program and was developed to allow MZiB staff to continue to adhere to Fern's contraception protocol while simultaneously increasing her welfare (as evidenced by her improved responses and behaviors) both during and after each application. This new method reduced stress on her by removing unnecessary steps of the existing methodology (such as transportation), desensitizing Fern to the presence of restraint tools, and increasing reliability and consistency in her training sessions by establishing a stronger animal-keeper relationship using positive reinforcement.

The training program was broken down into three milestones: 1) desensitizatio n to the visual presence of the net; 2) entering the net; 3) re-entering the net after an injection (Table 1). The desensitizatio n process involved the greatest number of approximations ranging from visually introducing the net at a distance and rewarding Fern for remaining calm while acknowledging its presence, to rewarding her for standing in the center of the net lying flat on the ground (Figure 1). Fern's curiosity and willingness to investigate the net, and that of her companion, helped this portion of the program to progress quickly. Positive reinforcement was paired with appropriate behaviors from both her and her sire during each of the approximations, when they approached the net, and for any type of positive or neutral interaction with it such as smelling, scent marking, or touching the net. After a few training sessions, as soon as the net was placed on the ground, Fern would run onto it and wait for a reinforcer.

Once the desensitization portion of the program was mastered, the second and third milestones hinged on training the novel behavior: entering the net. To start, the net was tented like a tunnel using either two binder clips on the mesh or a second person holding the back of the net (Figure 3). With the net in place, Fern was initially baited inside using a high value reinforcer. A food bowl, filled with normal diet items, was also a useful tool for baiting. It was occasionally placed in the back of the net to increase the duration of time Fern spent inside the net and increase her comfort level while inside the net (Figure 4). When Fern was comfortable going into the net consistently, animal keeper staff transitioned away from baiting towards conditioning her to follow a point cue to enter and exit the net. At the start of each session, instead of adding reinforcers to the net while Fern watched, reinforcers were already in place in the back of the net prior to it being tented. Additionally, thin slices of food items (i.e. craisins, grapes) were offered to Fern through the mesh of the net as she successfully followed the point cue in and out (Figure 4).

The next step in this program involved moving the net while she was inside of it with the intended goal of being able to lay the mesh of the net against Fern's back without eliciting a negative response (i.e. prematurely exiting the net). By dipping the mouth of the net towards the net bag, the roof of the net sagged downward and Fern was reinforced for each successive movement until she allowed the net to remain against her back for short periods. The final approximation for this milestone was closing the net completely, by dipping the mouth of the net away from the net bag and laying it flat on the ground (Figure 5). It is important to note that closing the net was not part of the regular training routine, but was typically done once or twice in the 42 day period between her injections to avoid her associating a closed net with an injection every time. The first time this was accomplished, Fern looked around and tensed, but calmed quickly into relaxed body posture and took reinforcers through the mesh of the net. After being released, there was hardly any regression and she reliably re-entered the net immediately after being closed in. This was even the case following an actual injection and is a testament to the success of the behavior.

This program took ten training sessions over two weeks to implement. Fern's first successful injection in the net occurred four weeks after the start of this program, and she has received six contraceptive injections in the net to date using this method.

Table 1

Description of the approximations used for training each milestone in the voluntary net entry program

Milestone	**Description of approximations**	**Criteria for progression**
Desensitization to the visual presence of the net	[a]Net placed well away from individual, outside of exhibit, but still within visual field. [a]Net placed directly next to individual, outside of exhibit, lying flat. [a]Net leaning against exhibit wall. [a]Net placed inside secondary containment vestibule. [b]Net placed inside of exhibit, lying flat.	Animal looks towards net while remaining calm Animal retrieves reinforcers off the net mesh Animal positions within net opening Animal looks towards net while remaining calm Animal stands on net
Entering the net	[c]Net tented, baited with high value food item(s). Introduce visual cue and decrease baiting. Animal enters net on visual cue. Movement of the net/net touches animal while it is inside of the net.	Animal enters net and proceeds to the back of the bag. Animal enters net on cue then receives reinforcement through the net mesh. Animal remains inside the net, no reaction to the movement/contact.
Re-entering the net	Net tented again immediately after its closing (i.e. for an injection)	Animal re-enters net after it has previously been closed on them

Note. Criteria for proceeding to the next approximation was always evaluated on an individual basis. The ability to progress and regress were fluid, evaluated and adjusted during each training session.
[a] = Figure 1 provides visual reference, [b] = Figure 2, [c] = Figure 3.

Benefits: Success is Contagious

The voluntary net entry program became such a useful behavior that it was modified and applied to all

of MZiB's lemurs: 1.1 Red-ruffed lemurs (*V. rubra)*, 1.1 Ring-tailed lemurs (*L. catta)*, and 1.2 Coquerel's sifaka (*P. coquereli)*. In addition to Fern, MZiB's female *P. coquereli*, "Anastasia", has also received four contraceptive injections using this method. Also joining the ranks of success is MZiB's male *V. rubra*, "Shamus" who received an anesthetic injection, after voluntarily entering the net, for his annual physical exam. In this application, the net entry behavior not only eliminates the potential stress of traditional netting and darting, but it also provides a controlled and safe mechanism for the administration of a wide variety of treatments. In addition, this behavior is also effective in providing a secure environment, while staff induce anesthesia, which greatly enhances the safety and success for the animals in required medical procedures.

From a temperament standpoint, Fern is now more eager to train and interact with animal care staff. This change has been beneficial in many aspects of her husbandry practices, training program, and overall welfare. She readily participates in training sessions and demonstrates positive behaviors to her keeper staff as they approach. There has been a noticeable decrease in her previously negative association with the kennel; she now kennels reliably making the seasonal transportations between the indoor exhibit and the outdoor exhibit less stressful on her. She even takes reinforcers during transport!

Furthermore, the net no longer elicits alarm responses in any of the lemur species. Every lemur is eager to interact with the net when it is brought into their exhibit, so much so that animal care staff had to train the *P. coquereli* to station and wait at their own individual mat so that each could have an opportunity to do net work without interruption or competition from their companions.

Another great benefit is the fact that this behavior translates seamlessly into any enclosure or holding space where a net can fit. This was incredibly important for Fern because half of her contraceptive treatments were given in the outdoor exhibit and the other half needed to be given once she had been moved to her indoor exhibit. At MZiB, the voluntary net entry behavior is trained in holding spaces, indoor exhibits, and outdoor exhibits to ensure that an injection or restraint could be done at any time.

There are always new and innovative ways to improve the welfare of captive animals and the "voluntary net entry" training program has proven that. This program has inspired all members of the Chimpanzee Forest team at MZiB to re-engage with their primary training responsibilities and brought lemur training back into a priority spotlight, which was an unexpected benefit. This program has lead to an increase in training frequency from one/two sessions per week to at least four/five sessions per week. An inspired and motivated keeper staff can create great outcomes for the animals under their care. Transforming an object with a negative association into a positive one can lead to great improvements in an animal's welfare, in ways that staff never imagined.

Conclusion: Things to Consider

As is the case when training any behavior, it is important to understand the animal's natural temperament prior to starting a new training program, the temperament/disposition of that animal during a training session, any previous associations the animal may have with nets in general, and any environmental stimuli that may influence the speed of progression and the strength of the behavior being trained. Fern is a particularly cautious animal and was the first of the MZiB's primates to be trained on this behavior; the approximations leading up to her success were controlled and on the slower side. Emphasis was given to building a very positive trainer-animal relationship. On the other hand, Shamus (male *V. rubra*) already had a strong trainer-animal relationship and, being a naturally outgoing and training motivated individual, he required only five sessions over the course of one week before he was reliably entering the net. Flexibility and the assurance of knowing when to progress and regress through the program based on the target animal's behavior is fundamental to this program, as is environmental stimuli.

Environmental stimuli should always be considered before starting a training session involving the net. Elements such as: wind speed, temperature, number of guests nearby, other animals in the area, etc. all have the power to influence the outcome of a training session. Setting oneself and the animal up for success involves combining all of these elements and adjusting accordingly.

Appendix A: Images of training approximations

Figure 1. Approximations in the first milestone of the training process--net desensitization. A = net is placed along the fence behind the exhibit within the visual field of both *L. catta*; B = net is placed directly next to exhibit mesh, both *L. catta* retrieve reinforcers off the net; C = net is leaning against the exhibit mesh, *L. catta* reinforced for positioning in front of the mouth of the net; D = net is placed inside keeper vestibule.

Figure 2. Last step of the net desensitization milestone. The net is placed inside the exhibit lying flat on the ground. Food bowls were placed on top of the net to increase *L. catta*'s comfort level and the duration of time they spent physically touching the net.

Figure 3. Net setup for the second milestone--net entry. The net is tented against the mesh using two binder clips. This can also be done by incorporating a second person holding the net in tent position (a second person is used during sessions in which the net will be closed).

Figure 4. Successful execution of the second milestone. A = shows animal care staff giving the visual cue for both lemurs to enter the net with her right hand, while holding the mouth of net open with her left hand, male entering first; B = male *L. catta* enters the net fully and receives reinforcers at the back of the net; C = food bowl added to net (indicated by black arrow) to strengthen the reinforcer-net association and increase the duration the *L. catta* spend inside of it.

Figure 5. Closing the net and restraint for an injection. This image shows the net fully closed with Fern inside. She is restrained from the outside of the net with one hand and light pressure. She is fed reinforcers through the net while in restraint.

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Breaking down Barriers through Barriers: Training Southern Cassowary for Voluntary Injections in a Protected Contact Environment

Samantha Kaeser

Brevard Zoo

An outbreak of encephalitis last year prompted the need to vaccinate Brevard Zoo's ratites against the deadly disease. In order for the process to be the least intrusive and most positive experience for animal and staff alike, the Austral-Asia keeper team was tasked with training the zoo's 1.1 Southern cassowary (Casuarius casuarius) to stand for voluntary injections in a protected contact environment. The cassowaries have two different personalities. When training began keepers quickly had to modify the training plan for each individual bird. Small approximations and inventive thinking helped shape the desired behavior from the male. The female required much more time as well as modifying the behavior criteria to make the training plan successful. Both cassowaries successfully achieved the behavior and were able to be vaccinated with less stress to them, to the vet staff, and to the keepers. Voluntary injection training can be applied across all species and is the least stressful method for medicating and vaccinating animals. Empowering an animal to choose to participate in their own health care rather than using restraint or immobilization provides them with the highest level of animal care.

Introduction

Brevard Zoo houses 1.1 Southern cassowary, Sydney and Ginger. Each has its own yard, separated by fencing and foliage. Both have sliding doors that access a shared outdoor shifting area with access to a barn stall. The keepers refer to the shifting area as the "airlock." This is where both cassowaries are trained and where most of our interactions with Sydney and Ginger take place.

With some recent cassowary deaths in the United States due to encephalitis, we knew we had to vaccinate quickly, but wanted to achieve this in the least intrusive, most positive way possible. Both Sydney and Ginger had previously been trained target, scale, and how to shift into a barn stall, so we knew how motivated and trainable they could be. We had confidence that we could set them both up to experience the least amount of stress possible to make the injection procedure successful. The vaccination that was administered was for West Nile virus, Venezuelan equine encephalitis virus, Western and Eastern equine encephalitis virus, and Tetanus.

Personality challenges

Sydney and Ginger are two individuals with contrasting personalities. Sydney is animated and feisty most of the time. He has a high energy level and frequently displays chest bumping towards people along the fence line. He will calm down around his keepers and during training sessions. This energetic eagerness helped him progress quickly in his training because I could create behavioral momentum during sessions to progress faster.

Compared to Sydney, Ginger is mellow. She's slower to move, and has a more lackadaisical attitude, except during breeding season. She is leery and stand-offish about new situations whereas Sydney will investigate new things and even display typical cassowary aggressiveness. Ginger's personality and a medical issue added to the amount of time it took for Ginger to learn the behavior, but in the end, she was successfully vaccinated with minimal stress.

Methods

Neither cassowary had been trained with more than one keeper present. To desensitize them to having more than one person present, I had another keeper, Ellen, stand next to me while I asked them for basic targeting behaviors. Sydney required one training session to become comfortable performing behaviors with more than one person present. Ginger required three training sessions with two people present before she would perform any behaviors.

After desensitizing the cassowaries to multiple people, I had Ellen stand with a long, skinny bamboo stick in her hand, which we used as our mock injection pole. After the cassowary did not react to the second trainer holding the bamboo stick, it was replaced with an injection pole and blunted needle to desensitize them to the poke of the needle.

When the bamboo pole was placed through the fence, Sydney investigated it right away. He tried to target the bamboo stick. He also became aggressive towards the bamboo a couple of times by chest bumping and hissing at it. When he realized he only received reinforcement for ignoring the stick, he quickly ignored it, regardless of its proximity to him.

Desensitizing Ginger to the bamboo stick through the fence was a little more challenging. Ginger would come to her usual training spot along the airlock fence, but as soon as the stick was placed through the fence, she would immediately stop training. She would remain standing in the same place, but she refused to perform any behaviors asked of her.

I tried placing the bamboo stick through the fence before opening the shift door to give her access to the airlock. She would come into the airlock but would not train while the stick was through the fence. It took four more sessions and a lot of patience on my part before Ginger was comfortable. She eventually did try to target the bamboo, but, like Sydney, she realized she only received reinforcement for ignoring the stick and began to train normally with the bamboo in place. Both birds became so comfortable and desensitized to the bamboo and the mock injection pole that, by the end of the training, both were leaning into the pole when it was touched to their bodies.

Their previous targeting criteria was also a small challenge I had to overcome. Both cassowaries were target trained, but the criteria for targeting was just touching the pole anywhere with their beaks. When both of them targeted, they tended to touch the end of the target pole, a large, wood dowel rod painted blue. This meant that they were usually facing the front of the trainer. To receive the injections, they needed to be lined up with their bodies parallel to the fence line. When the birds were required to touch the side of the target pole, they tended to assume a more sideways stance rather than facing me head-on. It took quite a few training sessions of only rewarding the touching of the side of the target pole before I started the actual "line-up" behavior.

Training Sydney

During our earlier sessions, I noticed that when I faced Sydney, he would look head-on as well, sometimes chest bumping the fence. When I faced sideways/parallel to the fence, Sydney tended to remain sideways as well. To achieve the line-up behavior, I began targeting Sydney on one side of the fence then walking forward a few steps and quickly targeting him again. He was only bridged when he touched the target and stayed sideways. He soon caught on that he would not be rewarded if he tried to face me. A verbal cue of "line up" was paired with a visual cue of swinging an arm while the initial target was faded out. I had to get longer tongs for administering the reward so that it was given in front of his face while he was still parallel. With shorter tongs or by hand, he would turn his entire body towards me to receive the reward, breaking his parallel stance.

Sydney had his official vaccination injection performed by our veterinarian after only 15 training sessions.

Training Ginger

Ginger has always been less motivated than Sydney when it comes to most things. When asked to target, she was very slow to take steps towards the target and would try to stretch her neck and body as far as she could to reach the target to avoid picking up a foot to step forward. Her training progressed more

slowly because of this. I had to be stricter with her targeting criteria and would place the target just out of her reach so she would have to take a step. Although, if the target were placed too far away and I asked her to move more than one or two small steps, she refused to perform the target behavior at all, no matter what kind of tasty reward was waiting for her. Ginger's "line-up" behavior was eventually accomplished successfully by using small approximations of targeting her. I asked her to take small steps toward the target to move her into the parallel position with her body close to the fence, the perfect posture to receive an injection.

There was a small setback with Ginger's training when she started having some medical issues. She started to lose feathers on her left thigh and underside of her body. She was also exhibiting an abnormal gait. First, she began walking with a small hitch in her step. Then, the hitch progressed to a strong limp. She was anesthetized for an exam and treated with Meloxicam (non-steroidal anti-inflammatory), Ceftiofur crystalline free acid (long-acting antibiotic) and Normosol-R (fluids). The medical procedure made her leery of keepers for the next week, but the injections she was given did improve her condition. Training for both birds was put on hold until we could get Ginger comfortable and back into her usual shifting procedure. For the most part, the effects of the procedure to Ginger's behavior were minimal. To set Ginger up for training success, I took it slow and regressed to the basics when getting back into her scheduled training. For the first few sessions, I lowered her new targeting criteria and rewarded her for targeting anywhere within the training area. She was still required to target the side of the target pole and was not rewarded for touching the end of the pole.

Ginger received her vaccination after 25 training sessions.

Conclusion

Ultimately, empowering an animal to choose to participate in their health care rather than using restraint or immobilization provides them with the highest level of animal care.

The experience of voluntary injection training our two cassowaries has shown us that two different personalities cannot be trained the same way. The training plans have to be constantly changing and evolving to accommodate each individual. Observations of the animals and how the trainer interacts and reacts to each individual are essential to training success.

The line-up behavior that was trained can be used not only for voluntary injections, but also as an initial base behavior for many other husbandry procedures including physical exams. Her keepers have been using the line-up cue to work on tactile training with Ginger. Ginger's increased exposure to more difficult training situations has helped her and her keepers with many important training opportunities. Since training the injection behavior, she has been more confident when asked to perform complex behaviors. She was trained to enter her pond to show off a few of her natural water behaviors and was also trained, in less than a month, to enter a large transport crate.

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The Eyes Have It: Training 0.1 Jaguar (*Panthera onca*) for Voluntary Application of Eye Drops Following Cataract Surgery

Sarah Colman

Palm Beach Zoo

The Palm Beach Zoo currently houses 0.2 jaguars (Panthera onca), ages 10 and 20. The younger female, "Izel", presented with severe cataracts in both eyes. She adapted to the resulting vision loss, showing no issues navigating exhibit areas or finding food. However, in late 2014, she walked off an exhibit ledge and fell ~12 feet to the ground, falling on the edge of the exhibit water feature. Although she escaped lasting injury, it prompted a conversation between veterinary and animal care staff about risks for future injuries and what could be done to mitigate them. Cataract surgery had been successfully performed on two birds at the zoo earlier that year, so the conversation turned to whether a similar procedure would benefit Izel. While the surgery seemed logistically possible, the aftercare presented issues. It was apparent that the difference between the surgical aftercare for the birds and the aftercare for Izel was that while restraining the birds daily for eye drops was possible, it would be impossible for an adult jaguar. Izel needed to learn to voluntarily accept eye drops following her surgery, as she could need drops as often as three times per day for several months. The consensus among all staff was that the behavior would need to be completed prior to scheduling the surgery. This paper will detail the process of training this behavior, the collaboration between animal care and veterinary staff, and the results of surgery and after care for this animal.

INTRODUCTION

The Palm Beach Zoo currently houses 0.2 jaguars (*Panthera onca*), ages 10 and 20. The younger female, "Izel", has been diagnosed with multiple medical issues during her relatively short life, including syndactyly in both front feet, malformed heart valves, exocrine pancreatic insufficiency syndrome, and severe cataracts in both eyes. Despite all of these issues, Izel seemed to exhibit normal behavior and was managed in a typical fashion. In 2014, an exam revealed that her cataracts had progressed to the point that her vision loss was significant, although there had been no behavioral changes indicating this. She had apparently adapted to the vision loss, showing no issues navigating exhibit areas or finding food. However, in late 2014, she walked off an exhibit ledge and fell ~12 feet to the ground, falling on her right side half in an exhibit water feature. Izel was clearly injured from the fall and had trouble pulling herself out of the water feature. When she was able to get out of the water, she seemed to have trouble walking and using her right rear leg. It took over a week for Izel to fully recover from her fall. After speaking to witnesses, it was determined that Izel likely did not know how high she had been and did not know how to get down from her perch. She had been observed reaching out from the ledge with her paws, seemingly in an effort to find a step or way to get down. Finding none, she made the decision to leap off the ledge without knowing exactly where or how far down she would land. Although she escaped lasting injury, it prompted a conversation between veterinary and animal care staff about risks for future injuries and what could be done to mitigate them.

After discussing ways to modify the exhibit to prevent Izel from climbing without restricting the ability of the other jaguars to use the same features, the discussion naturally turned to treatment options for the cataracts themselves. Cataract surgery had been successfully performed on an eagle and a swan at the zoo earlier that year, so it seemed logical to address whether a similar procedure would benefit Izel. While the surgery seemed logistically possible, the aftercare presented issues. Both birds had been manually restrained for eye drops multiple times per day following surgery for several weeks. Clearly this would be impossible for an adult jaguar. Izel needed to learn to voluntarily accept eye drops following her surgery,

as she could need drops as often as three times per day for several months. The consensus among all staff was that the behavior would need to be completed prior to scheduling the surgery.

METHODS

After some trial and error, it was determined that training in the squeeze cage would be the preferred location for this behavior. Initial training sessions took place in the night house stalls, but this placed Izel much lower than the trainer when she was lying down. When the trainer leaned in to apply eye drops, Izel seemed uncomfortable and would lean away or pin her ears back. Moving Izel's training into the squeeze cage elevated her to closer to the trainer's eye level, reducing the need for the trainer to lean over her to examine and access her eyes. She was never closed into the squeeze cage and always had the option to remove herself from the training session. This seemed to increase Izel's comfort level, and training proceeded more quickly once this change was made.

A curved tip syringe was selected as the delivery device for eye drops. Practice with the syringe was needed to determine how hard a trainer could push on the syringe plunger to get a stream of medication that went fully into the eye but was not uncomfortable for Izel. The closer her eyes were to the syringe, the softer the trainer could push the plunger, thus getting her eyes positioned as close to the bars as possible was very important. Izel's natural head position during training meant that her mouth and nose were closest to the bars. The ideal position for medicating her eyes required her mouth and nose to be pointed down while she leaned her forehead against the bars, bringing her eyes well within range for medicating with the syringe. This proved to be more difficult than initially expected. It was counterintuitive for Izel to orient her mouth away from the trainer's hands, which normally delivered food during training sessions. To orient her head properly, she was taught to target her forehead to the trainer's palm. This was accomplished by baiting her nose and mouth downward while having the other hand in the cue position (palm flat held slightly back from the bars where her forehead was desired). As her mouth and nose followed the hand with the bait, she was bridged and rewarded the moment her forehead touched the bars where the cue hand was positioned. The bait was phased out as quickly as possible. Once she understood that targeting her forehead to the palm of the cue hand was desired, the duration of the behavior was extended to three seconds, which was estimated to be the amount of time needed to medicate the eye. The same cue was used for medicating each eye. She was cued with the right hand to medicate her right eye and with the left hand to medicate her left eye.

The hand that was not being used to cue the forehead hold was used to hold the syringe and administer the medication to Izel's eyes. To start, Izel was desensitized to the trainer's hand being moved toward her eye without holding the syringe. Once she was exhibiting no reaction to having the trainer's hand moved toward her eye, the trainer began holding the syringe. Accustoming Izel to the syringe took time, as she seemed to find having it near her face aversive, although she only attempted to take it from the trainer twice during the entire training process. Once Izel was able to maintain her forehead hold for three seconds and allowed the hand with the syringe to come close to her eye, the trainer began directing small puffs of air from the syringe to Izel's eye. After the amount of time it had taken to accustom her to the syringe itself, it was assumed that she would find the introduction of air against her eye aversive also, but she showed little reaction to this approximation. Since Izel had no reaction to air being introduced against her eye, training quickly moved on to application of saline in the eye. Warmed saline was used to make its application as comfortable as possible. Izel initially had a strong startle reflex to the introduction of saline to her eye, but this passed quickly. The day following the initial introduction of saline, Izel refused to train for the first time since the training process had started, which was an expected regression that had been predicted in the training plan. The next day, however, she was training again and never again refused to train during the training process. Once Izel was taking saline without a reaction in her right eye, the training process was repeated with her left eye. The left eye approximations proceeded much faster than they had for the right eye, presumably because they were now familiar to Izel.

Once Izel was taking saline reliably each day in both eyes, two additional trainers were incorporated into the training so that there would be coverage for her training seven days a week. This increased the number of trainers available to give Izel eye drops from one to three. After some initial reluctance to accept

eye drops from the new trainers, Izel began performing up to criteria. It should be noted that the trainers were new to this training process but were well known to Izel as they often worked in the jaguar building.

RESULTS AND DISCUSSION

Izel's cataract surgery was performed in early November 2015. During surgery she received two new custom-made lenses and was the first jaguar to ever receive endolaser therapy following surgery. While she rejected most oral medications in the days immediately following surgery, she never refused to receive eye drops. For the first two weeks following surgery, Izel was kept inside with conditions as dark as possible as she seemed to find light painful and she needed time for the incisions in her eyeballs to close and heal properly. Introducing foreign matter such as dust into her eyes during the initial stage of healing could result in serious complications. She was prescribed three different medications per eye twice per day. After the first two weeks, Izel was given access to an off exhibit outdoor yard, although she rarely went outside for approximately six weeks. Her initial medication regimen continued for eight weeks. Izel never refused receiving eye drops during this time. After her medication regimen was reduced to two medications per eye twice per day, Izel was allowed back into a normal exhibit rotation. Izel continued to take her eye drops each day without fail. The specialist who performed her surgery came every two weeks to do a visual exam on Izel's eyes and determine if her medication regimen needed to be altered.

Over the course of almost six months, Izel's medication regimen decreased in the number of medications per eye and the number of times she needed to receive medication per day was reduced from twice to once. Through it all, Izel never refused to take her eye drops, which had originally been scheduled for ten to twelve weeks but were extended to almost twenty-four weeks due to slow healing in her right eye. Even though her right eye was slow to heal, Izel experienced no complications due to this and her surgery and the treatment following was determined to be a complete success by all involved. Her reintroduction onto exhibit was very exciting for staff and it was gratifying to see her moving easily around the exhibit and noticing things she had never reacted to prior to surgery, such as the tapirs living in the neighboring exhibit and the wild birds who regularly entered the jaguar exhibit. Keepers also noticed an increase in positive interactions with the keeper staff and an increase in affiliative behaviors such as head rubbing directed toward keepers. Izel was more playful and affectionate with keepers than she had ever been in the past and was far more interested in following them and watching what they were doing than had been observed before. A marked decrease in behaviors that keepers had associated with poor sight were observed. These included feeling around on the floor with her front feet for food and enrichment, hitting her head on door frames and branches, and an unwillingness to enter dimly lit areas. As keepers saw these behaviors greatly decrease or disappear altogether, it served to reinforce the evidence that Izel's surgery had not only been a great success medically, but it had a tangible effect on improving her quality of life.

Izel's journey through the training process took almost ten months and the recovery period following her surgery lasted almost six months. It required a long term commitment of labor, time, and patience from both keeper staff and veterinary staff to be successful. We are both proud and thankful that we were able to use our available skills and work together to provide an innovative solution to a real and present animal welfare issue. This surgery and the care following improved Izel's life in both quantifiable and immeasurable ways immediately and we have no doubt that the effects will continue to be observed into the future. Izel can now see the world around her with new eyes, and it is our pleasure to have been a part of making that happen.

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Untapped Potential: Enriching Our Animals through Behavioral Research

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While the concept of enrichment in zoos has manifested in a wide variety of forms [e.g. tactile, olfactory, EED's], one underutilized opportunity to enrich our animals' lives is through behavioral research. With constraints on funding, staff, and time often diminishing the priority given to research endeavors, we encourage the zoo community to re-consider the benefits beyond the obvious value of increasing our knowledge and improving the quality of care. By giving animals the opportunity to participate in a behavioral study, we are creating change in the environment, promoting interactive choice-based activity, and stimulating mental and/or physical exercise. We will describe a cognitive experiment recently conducted with the Busch Gardens Tampa elephants as a tangible example of the enriching potential of behavioral research, challenges inherent in applied settings, and ways we incorporated variability into sessions while maintaining scientific rigor.

Zoos, aquaria, and related facilities have evolved with respect to their understanding of the higher-level needs of the animals in their care. Enrichment is no longer considered a luxury, but a necessity used to maximize welfare by providing behavioral choices and drawing out species-appropriate behaviors through changes in the environment (AZA Behavior Scientific Advisory Group, 2014). While there is occasional disagreement in the field in regards to what qualifies as enrichment, the concept has manifested in a myriad of applications including environmental enrichment devices (EED's), sensory, social, food, and habitat. One possibility for providing enrichment to animals that is often overlooked is through behavioral research.

Zoos have served as a critical site for conducting behavioral research for decades with the obvious goals of increasing our basic knowledge of animals, then applying that knowledge toward improving their care and conservation efforts (Kleiman, 1992). Beyond the inherent value, we propose that the process of conducting behavioral research can itself be enriching to the animals engaged with it. This is not to say that any study automatically qualifies, but that specific design elements can contribute toward the enriching value while still maintaining sound, scientific rigor.

Unfortunately, many facilities face numerous constraints that limit the amount of research they can undertake. Already strained resources for funding, staff, and time sometimes preclude a robust commitment to research. However, by recognizing the value of research, both in long- and short-term gains, the benefits should outweigh the costs. Not only can data be collected without diverting resources from the care of the animals, on the contrary, their lives may even be more enriched. Furthermore, by being creative with available resources, many facilities may unknowingly already have the funding, staff, and time needed to work research sessions into their day.

If participating in behavioral research is to be considered a venue for enrichment, it should be analyzed with the defining features of enrichment in mind. The research session should create change in the environment, provide behavioral choices, draw out species-specific behaviors, and even stimulate mental and/or physical exercise. Ultimately, it should contribute to enhancing animal welfare. At Busch Gardens Tampa Bay, the resident elephants recently participated in a cognitive study that will be used as an example for exploring each of these facets.

Materials

The Asian elephant (Elephas maximus) herd at Busch Gardens consists of one male and five female adults. The herd is managed in a protected-contact setting, with trainers using only positive reinforcement training (PRT) in a choice-based environment since 2004. The program touts a dynamic behavioral management style with frequent changes throughout the day to the elephants' physical and social environments, as well as a commitment to variability. Research sessions were conducted outdoors on the main habitat at the Elephant Interaction Area, where members of the herd frequently join trainers for interaction in the form of learning, husbandry, and relationship sessions through a husbandry gate. This area was constructed to enable guest viewing of these interactions and procedures, although for space reasons, remained closed to guests during testing.

Methods

The study was a systematic replication of the Irie-Sugimoto, Kobayashi, Sato, and Hasegawa (2008) experiment, where only two elephants were tested in a free-contact setting. The nature of the study involved a means-end task, where elephants could demonstrate whether they understood the means to achieving an end goal: in this case, accessing distant food. In order to test this, each elephant was given the opportunity to choose one tray from an array of two, where only the near end of the trays was in reach of the elephant's trunk. One of the trays was always baited with a highly-valued food item at the far end of the tray out of direct reach, so that the elephant had to pull the tray toward him/her in order to access the food. The other tray in the array was either not baited (Condition A), baited on the floor next to the tray (Condition B), or baited on the tray but with a gap in the middle (Condition C), so that none of these options were viable for accessing food. Could the elephants identify the relevant features of the stimuli presented to them and understand that in order to access the distant food, they must pull the tray toward them that is supporting the food item?

Results

The results indicated that all six elephants succeeded on Condition A in 30 trials and Condition B in 40 trials or less. None of the elephants performed above chance levels on Condition C within 50 trials. In contrast, at least one of the elephants in the original Irie-Sugimoto et al. (2008) study succeeded in all three conditions, but they learned it over time taking up to 250 trials to demonstrate proficiency. The Busch Gardens elephants appeared to show a spontaneous understanding of the means-end relationship, at least in the first two conditions. The final condition was more difficult, involving the relatively more complex concept of connectedness. It could also be argued that this condition deviates more from the experiences the elephants may have had in their environment (e.g. pulling on a tree branch to access the leaves), among numerous other possible explanations.

Regardless of the results obtained, the keen willingness of each elephant to actively engage with the means-end task supports the notion of its enriching value, but we must parse out the relevant factors, beginning with the change in the environment. Asking each elephant to approach the Elephant Interaction Area was not novel, but the physical set-up in preparation for trials was, including the specific configuration of open windows, an additional wooden attachment to the husbandry wall, and the view of the supplies. At the beginning of testing, the trays themselves were also a novelty to be explored and even played with. During the time of the day that the elephants would normally be involved in any other activity, being able to actively participate in the interactive research session itself created a notable change in their environment.

Because each elephant was tested one at a time, they had an opportunity for more one-on-one interaction with trainers without having to share attention with other elephants. However, typically other members of the herd were still present elsewhere on the same habitat at the time of testing, so they maintained access to conspecifics if at any point they decided to terminate the session. Because the Busch Gardens herd is managed in a truly choice-based style, any elephant could leave the testing area for not only conspecific interaction, but also to access the waterfall, swimming pool, dirt pile, hay/browse, or any other reason. It was

up to the trainers running the data collection to keep the session reinforcing for the elephant being tested in order to maintain voluntary participation.

Not only was participating in the trials a behavioral choice out of many available in the environment, but the paradigm itself gave the elephant the ability to choose between two trays. Since the alternate tray was removed as soon as the other was selected, the elephants learned quickly that they could not have both, which encouraged them to choose wisely. This challenge became a game or even a puzzle, providing mental stimulation. They had to visually gather information about the baited trays, consider their options, and then choose. The order of the conditions increased in difficulty as the elephants mastered each one, ensuring that the task continued to be stimulating throughout the course of data collection.

In addition, the sessions involved various physical activities, as well. First, the elephants had to maneuver their trunk through the window in the husbandry wall to access the trays. Then, they practiced fine motor dexterity in the manipulation of the trays using the prehensile tip of their trunk. Finally, they turned their bodies around 180 degrees and walked between the testing area and the trainer waiting at a designated space between each trial. While these physical movements are already promoted with other more traditional environmental enrichment designs and trainer interactions throughout the day, the research sessions proved to be an extension of that strategy, rather than a detraction from it.

Discussion

The behaviors emitted by each elephant while taking part in these research sessions would be considered species-specific. For example, elephants are known to be intelligent, large-brained mammals, and actively using those brains was required for success in the task. Additionally, elephants utilize their trunk for reaching and picking up desired items from a distance, inherent in the design of this study. Furthermore, while being fully engaged with the trainers and task during trials, the elephants were not emitting any stereotypical behaviors, as they are incompatible. Therefore, not only did participating in the research promote species-specific behaviors, but it also discouraged undesirable behaviors indicative of stress or boredom - another goal of enrichment.

There are challenges inherent in applied behavioral research beyond the potential facility constraints already discussed, but they are also not insurmountable. Most significantly, as any animal professional knows, the care and welfare of our charges are the top priority. Sacrifices to their well-being should never be made, including but not limited to extreme deprivation, forced participation, negative impacts to social dynamics, or the use of aversive stimuli. Even though following these guidelines may create some delays, prior planning using creativity, as well as flexibility, can set research projects up for success. For example, trainers in the means-end study had to be creative with the type of food used to bait the trays, using novelty, variety, and scarcity of the specific food type while still providing access to other food before trials. This ensured that no compromises were made in regards to welfare, but that participation was still likely.

There are many factors beyond the control of the zoo staff/experimenters, including the weather, biological processes (e.g. behavior related to breeding), or even wildlife not managed by the facility (e.g. hungry squirrels stealing bait). The key is to identify when these issues can be worked around, worked through, or simply when patience is required to wait out the situation. Due to the variability in the environment for any applied study, it is recommended to control for as many potentially relevant factors as possible. Maintaining consistency by not running trials on a rainy day, for example, will help rule out the rain as a possible influence on the behavior and performance of each subject. Furthermore, steps were taken to control for unintentional trainer effects, such as keeping the trainer near the baited trays "blind" to which side was correct. Food odors were also neutralized by wiping each tray clean between every trial.

With strict protocols in place to control for extraneous factors, the trainers were still able to incorporate variability into the sessions in ways that would not impact the study. This played a crucial role in ensuring the task was reinforcing enough to maintain interest. Not only was the baited item varied from trial to trial, but the trainer who called away the elephant while the next trial was set up utilized a variety of reinforcers for coming to control, as well. In an effort to balance the reinforcement between the test-

ing area and away space, much care was taken by this trainer to use minimal primary reinforcers and incorporate numerous secondary reinforcers, including tactile stimulation and object retrievals, for example.

While the study described serves as a single example, the many other behavioral research projects already completed and those not yet imagined provide infinite possibilities for zoo and aquarium animals to be enriched. We still have much to learn about the animals in our care, and conducting research creates more opportunities to change the environment, provide behavioral choices, promote species-specific behaviors, and overall to enhance welfare in the process. Even though the argument posed here only supplies a subjective, anecdotal piece of evidence supporting its case, it can serve as a starting point for future research. There are many individual animals of many species who may just appreciate the opportunity to empirically test whether or not behavioral research is, in fact, enriching.

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A Key to the Misunderstood: Relationship Building with an Age-Old Predator

Nelly Rivera

Theater of the Sea

They are an apex predator who have survived since the cretaceous period. They are nurturing mothers, respected in nature, but feared and misunderstood in our modern world. When environmental challenges pushed them to the brink of extinction they rebounded with astonishing success. They are the Crocodilian Species. Theater of the Sea is home to some of these species. Alley, a female American Alligator, came from a local souvenir shop where she was not able to thrive in a natural environment and was fed an inappropriate diet which lead to digestion issues. At our facility she was provided with a lush, natural habitat and was started on a trial of diets to overcome the challenge of digesting her food. Although Alley was on a path to an enriching and healthy life, she still held an aggressive nature that was challenging for trainers to conquer. Eventually, a strong relationship was built through trust, dedicated time, and a deep understanding of this extraordinary species. This paper will illustrate the steps we took towards the husbandry training which now allows us to conduct voluntary behaviors such as ultrasound, radiographs, blood draw, weights, and crating. All of our crocodilians now participate in their own health care and are even capable of learning fun behaviors like painting, carrying a flower, and walking alongside their trainer. My paper will serve as a guide for other facilities to mirror this training from the beginning and will include recalls and signals, bridging, various types of reinforcers used, and troubleshooting.

Introduction

This story begins with Alley, an adult female American alligator *(Alligator mississippiensis)*, who arrived at Theater of the Sea (TOTS) in 1997. She came from a local Florida Keys souvenir shop where she had outgrown her habitat. Being an aggressive predator by nature, Alley proved to be a challenge for animal care staff at TOTS. In order to clean her pool, trainers would enter with safety shields and do their best around her as she hissed, pushed at their shields, and whipped her tail. Providing enrichment to Alley was difficult. She was possessive over approved items. Removing the "toys" from her housing was nearly impossible.

In 2008, I had just been hired, my first job in animal care and training at TOTS. From the first time I met Alley, I knew there was something extraordinary within her. During feeding times she would stand up high and climb the fence in anticipation. What other trainers had mistaken for aggression, I saw as eagerness for stimulation. I began asking Alley to relax prior to feeding her and the response was incredible. Within just a couple of days the unwanted behavior of climbing the fence was eliminated. Little did we know, this was just the beginning. This animal was more intelligent than any had ever imagined. It was going to be an innovative year, full of possibilities!

Where to go from here. How do you effectively and efficiently train a cold-blooded animal that gets fed a couple of times per week? There was not much primary reinforcement available as she would eat one rat or five mice during a feeding session that occurred a couple times a week. We used ice, which she seemed to enjoy in small quantities. One day it came to me when a co-worker was complaining about slippery gelatin being left in the chum bin that is collected daily from the marine mammal fish house. I said at once, "Why not use the gelatin? We already use it for the marine mammals at the park, so why not with the reptiles?" This turned out to be key to starting a training program using operant conditioning with the crocodilians *(crocodilia)*. The idea was presented to the enrichment coordinator, Tessa Lackland, and curator, Beverley Osborne, for approval. They loved the idea! Beverley wanted to start immediately and with consent from our reptile veterinarian, we began using the Knoxx sugar free gelatin. Tessa's experience as a dolphin trainer

and love of enrichment made her the perfect partner to create a training plan that would mirror the operant conditioning used with the marine mammals. We were paired together to start the training program.

The initial step before any behavior plan was started was to train Alley to eat the gelatin, which she accepted immediately without any conditioning. The challenge was figuring out exactly *how* to feed the gelatin. There were a few ideas on how to get her the reinforcement. Tossing it to her through the chain link fence? Relying on trainers' aim and the potential of causing frustration for the animal was not the best idea. Tongs currently used for feeding turtles? They were too large to fit through the fence and the gelatin slipped off. Lastly, we found other facilities used long hemostats. These long hemostats turned out to be exactly what we were looking for. The only challenge left for feeding was developing a skill of holding the gelatin with the hemostats, and moving it through the fence. Imagine eating a cup of jello using chopsticks. After perfecting the feeding technique, we used the gelatin to engage Alley in more sessions daily.

The next step was training Alley to recall to various locations within her habitat. She had been previously trained to recall to one station used for feeding. The goal was to get her to a separate station away from the pool and the exhibit exit, allowing trainers to clean the pool in a safe and stress free manner. Although her environment was set up conveniently enough for such an area, we still needed to approximate the new station. First we waited for her to be in close proximity to the designated station. The shorter distance improved the odds of her successfully recalling to station. The first session was a success. Distance was increased until we were calling her to the land station from her pool. Training Alley to a new station and remain engaged has created a great improvement on habitat maintenance and upkeep. Alley's reaction to her weekly pool cleaning has changed, from a negative history to positive interactive sessions.

We did not stop working towards improved habitat maintenance. Historically it took three trainers to clean Alley's pool and they each had a role to play. **Trainer A** worked with Alley via protected contact, **trainer B** was inside the housing with a safety shield in case Alley broke station, and **trainer C** cleaned the pool. Sessions were squeezed in when we could, and did not always have three trainers available at the same time. To minimize staff needed for maintenance, we began approximations to set Alley up to stay on a control station while we cleaned. We added visual aids such as a white piece of starboard to designated station areas. The idea was for her to remain on contact with the board. Our approximations started out by having her simply come to the boards, which were already established stations. We had started using an ACME 210.5 dog training whistle as a bridge. She learned quickly that reinforcement would always follow the sound of the whistle. Using her newly acquired knowledge of the bridge to our advantage, we continued on with approximations. We started stepping away from the station board at different time intervals until we were able to come around and enter the habitat, all the while she remained steadfast on her designated station. Over time, with increased comfort working with Alley, we upgraded from the awkward clunk of a safety shield, to a bamboo stick which allows more dexterity. Alley will now remain on a control station for up to 20 minutes while only two trainers clean her pool.

Our mission is to provide a wonderful home for our animals while sharing them with visitors in ways that inspire awareness and sensitivity towards animals, the environment, and conservation issues. The relationship built with our crocodilians through our training program has given us the opportunity to get to know the natural behavior of an animal that has been misunderstood for generations. As animal behaviorist Karen Pryor said, "*Training with reinforcement can be used as a window into the meaning of the animal's natural behavior. The interactive positive reinforcement training setting is an excellent way to become acquainted with the nature and function of an unfamiliar animal species, enables communication to occur on a level considerably exceeding that of usual animal/human interactions and is an excellent tool for the investigation of animal cognition. Conditioning is not only an end in itself, but also a tool to gain knowledge about the animal as a whole. This type of training is rewarding to staff and animals alike. Unlike techniques unfortunately utilized with most other animal species, marine mammal training is based on positive reinforcement, not correction, punishment, and aversive control. This type of shaping behavior allows the animal to show us their real natures and give us their best. If other animal species were trained this way, perhaps they too would be as eager, attentive, precise, cooperative, and capable as marine mammals. It is perhaps these circumstances, and not some intrinsic characteristic of the dolphin, which has given people such respect for the dolphins' abilities…we get more chances to observe cognitive processes in these animals than in others.*" (K.Pryor, 1975)

By incorporating the crocodilians learned behaviors into daily shows, we have influenced our guests' perspective on these exceptional, prehistoric reptiles. It is amazing to see onlooker's reactions to what they believed impossible as they exclaim, "I didn't know an alligator could be trained!" Awestruck, they crowd

around to watch our crocodilians emote and saunter over for interaction. Unfortunately, TOTS is a small facility in a remote area and the audience is limited. Not many people get the opportunity to see what these animals are capable of. We would like to share the knowledge. It is exciting to see other facilities starting training programs with crocodilians. For those who are stumped and not sure how to begin, here is the first step: **Build a relationship!** You may not believe this can be done with a reptile. This simple key is what will break down the barrier.

In the book *"Killing Keiko"* by Mark Simmons, he describes a relationship with the killer whales *(Orcinus orca)* similar to what I am talking about with our crocodilians. He even acknowledges the relationship between a boy and his dragon that is portrayed in the movie "How to Train Your Dragon". In this popular animated film , you can see how forming a trusting relationship can really turn a life around and create new possibilities. This is similar to the relationships we have created with Alley and our other crocodilians: Piper, a juvenile American alligator and Igor, an American crocodile. (*Crocodylus acutus*) The trust we have established has allowed improved healthcare, such as voluntary veterinary examinations, ultrasounds, radiographs, and blood draws. Here is a list of the behaviors they have learned.

1. **Recall** *Come to their name*
2. **A to B** *Go from one station/trainer to another*
3. **No Food** *Lets them know we are not here for a session*
4. **Down/relax** *To bring head down or relax* if they are overly excited
5. **Station** *Stay at a station with a trainer*
6. **Control station** *Stay stationary on a control station while trainer is away*
7. **Crate** *Go into crate on a verbal* S^D
8. **Pool** *Go into pool on a verbal* S^D
9. **Scale** *Walk onto a scale and stay while we read weight*
10. **Tactile** *Allow us to perform tactile/touch*
11. **Open** *Open mouth*
12. **Hold** *Hold still*
13. **Hold this** *Take something we give them to hold onto with mouth*
14. **Exam teeth** *With open and hold behavior combined. Inspect teeth*
15. **Target** *Come into contact with hand or target stick*
16. **Paint** *Holding paintbrush in mouth and doing strokes*
17. **Bring a present** *Take an item from one station and bring it to another station*
18. **X-ray** *Allow us to perform radiograph*
19. **Ultrasound** *Allow us to perform ultrasound*
20. **Blood draw** *Allow us to draw blood*
21. **Walk with** *Walk alongside trainer*
22. **Go swim** *Swim a lap and come back to station*
23. **Come here** *Bring snout out through a hatch*
24. **Back** *Back out of crate, or bring snout back in from hatch*
25. **Brush teeth** *Bring snout out and allow us to brush teeth with toothbrush*
26. **Eye drops** *Allow us to lubricate eyes using sterile eye drops*

While working alongside these amazing animals has been a rewarding experience, we have also faced some challenges in their training. First of all, they are not as food motivated as one would believe. Wild crocodilians eat only a couple times a month, depending on the size of their catch. There are several occasions in which they become "unresponsive"; they ignore our recalls and choose not to engage in sessions.

They stop feeding when the ambient temperature drops below 70° F (21° C) and become dormant below 55° F (13° C). Fortunately, in the Florida Keys, we do not get much winter however, our crocodilians still become unresponsive off and on during the season. Breeding season begins in spring for the American alligator and late fall or early winter for the American crocodile. Males may become territorial with other males and females will create a nest of vegetation which they can become territorial over. In human care, they can become distracted and unresponsive during this time. Around June 2014, Alley became unresponsive, which correlates with the standard egg laying months.(June/July) The ability to conduct a voluntary ultrasound confirmed Alley was gravid. She did not have access to a male, so we know the eggs were not fertilized.

Although appropriate materials were planted for a nest, she did not lay the unfertilized eggs. A follow up ultrasound was conducted several months after the end of breeding season to confirm our suspicion that the eggs had reabsorbed.

Now it is your turn. To start your relationship off, get to know the animal on a non-food based level. Observe them and note what time of day they are most active. Make your presence known without being primarily a food source. Bond with them by delivering some type of enrichment like buoys, boomer balls, bubbles, music, fresh water, ice blocks, watermelons...you name it. Find out what they enjoy most. Once the bond has been strengthened through the enriching sessions, feed them simply for being at a station or a simple response to a short distance recall. Delivering food for performing low effort behaviors will build a good reinforcement history. Once you have built up your reinforcement history, engage your animal in more challenging sessions. Don't be afraid to walk away from an unsuccessful session. Believe it or not, it helps strengthen the responsiveness more effectively. Choose a limit for how many times you try a recall for them to come to a station. Remember, they are reptiles and often not as quick to respond as a mammal, so have patience. We give them about 3 minutes between each of four attempted recalls. This teaches them there is a window of time to respond. Our crocodilians anticipate their training sessions and react well to very clear contingency for expectations. Nearly every time we have left unproductive interactions, they have been eager to come over when we start a new session.

It is important to have just as many "no food" sessions as feed sessions. You don't want your animal to see you as just a food delivery driver. You can use the word *no food* anytime you are around their habitat without engaging them in a session. Whether you are walking in or around the vicinity to drain their pool, or picking up enrichment, or turning a fan on, if you do not have food for them, let them know. Try to complete simple routine maintenance tasks outside of a feed session. An option in conditioning non food sessions is to use enrichment as a secondary reinforcer. If the animal is calm while you are inside their habitat, toss in some enrichment just before or after exiting. Using the enrichment aided in extinguishing Alley's behavior of hissing while we were in her environment during a *no food* session.

Over the time working with the crocodilians, we continue to strengthen our bond with each one of them. The positive relationship we develop with them allows us the opportunity for endless possibilities in their welfare. We are learning more about them every day. A colleague recently said to me, "We are all just guessing most of the time". It is time to change that. The closer we get to them, the better we can help their wild counterparts and encourage people to have a better understanding of them.

Some of our future goals include more sessions free contact based and to train the crocodilians to get into a stretcher, which would allow for easier transport. In the years to come, I would love to hear what new ideas you all have. One day you can tell me how you trained your *dragon.*

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Tsk, No, Eh-eh: Clearing the Path to Reinforcement with Errorless Learning

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We all know the saying, "If at first you don't succeed, try, try again." Unfortunately, trial and error approaches typically result low rates of reinforcement that result in unwanted fallout: Learners practice errors — making correct responding less likely and they become frustrated — setting the occasion for aggressive behavior and giving up. This fallout led researchers and practitioners to ask, are errors really necessary for learning to occur? Errorless learning is a term used to describe a teaching approach that limits incorrect responses. In this presentation, the basic elements of designing an errorless learning environment are discussed in order to design more effective, efficient and humane training plans.

Many of our most effective training strategies weren't as well known in the past as they are today. Take Thorndike for example, who in 1898 sorely needed shaping to teach a dog to go to the corner of a large pen. Thorndike wrote: I would pound with a stick and say, "Go over to the corner." After an interval (10 seconds for 35 trials, 5 seconds for 60 trials) I would go over to the corner (12 feet off) and drop a piece of meat there. He, of course, followed and secured it. On the 6th, 7th, 16th, 17th, 18th and 19th trials he did perform the act before the 10 seconds were up, then for several times went during the two-minute intervals without regarding the signal, and finally abandoned the habit altogether (p.77).

While Thorndike's apparent devotion to data is impressive, his trial and error approach to dog training got in the way of their success. I looked up trial and error in the Urban Dictionary – admittedly not exactly an academic resource but this "satirical crowdsourced online dictionary of slang words and phrases" ("Urban Dictionary, 2016), is right on target. The "crowd" contributed the following descriptions of trial and error learning:

- Trying something until you get it right.
- The next best thing to guessing.
- When you mess up repeatedly until you do something right.
- A person will try something, get it wrong, learn from the mistakes, try again, and hopefully eventually get it right.
- A systematic means of determining a solution to a problem, often involving a large amount of time; often involves eliminating possibilities.
- The story of my life.

Tradition

Trial and error (T&E) is the standard approach to teaching exemplified by the well worn proverb, "If at first you don't succeed, try, try again." While both operant training and T&E procedures rely on selection of behavior by consequences, success with the T&E approach is accidental, a chance occurrence. Although the feedback provided by incorrect responses (i.e., punishment or extinction) may eventually guide the learner to the correct behavior, it can take a lot of "Tsk, No, Eh-eh" consequences to prune the many incorrect choices off the possibilities tree. This makes T&E a slow process, which often leads to negative fallout. Learners practice errors and effort is punished (Chance, 2009, p. 312). Further, research indicates extinction

is an aversive procedure that generates undesirable emotional reactions described as frustration, aggression and giving up. Pierce and Cheney (2013) report the following fallout (information in brackets and italics added): Pigeons flap their wings in an aggressive manner and will even work for an opportunity to attack another bird during the presentation of the S Δ [S-delta, the extinction stimulus, i.e., the no-response signal] on a multiple schedule. Birds will peck a different key if such pecking turns off the extinction stimulus, implying that the stimulus is aversive. There are other problems with successive discrimination procedures. Because emotional behavior is generated, discriminative responding [correctly responding to the discriminative stimulus, SD, and correctly not responding to the extinction stimulus, S Δ] takes a long time to develop. In addition, spontaneous recovery of S Δ responding from session to session interferes with the acquisition of discrimination. Finally, even after extensive training, birds and other organisms continue to make errors by responding in the presence of the signal for extinction [S Δ] (p. 238).

The pervasive use of T&E represents, at least in part, the cultural fog about how behavior works. High rates of errors are not necessary for learning to occur and can actually work against mastery. To reduce the fog, it's important to be clear: Prompts are information, not bribes; operating on the environment to gain reinforcers is our biology, not a trick; and learning success resides in the environment, not in the learner. With less clarity than this we may miss the power of changing conditions to change behavior.

In an excellent article in which operant training and T&E are discussed, Rosales-Ruiz (2007) shared B.F. Skinner's perspective from his book, The Technology of Teaching, published in 1968: Errors are not a function of learning or vice-versa nor are they blamed on the learner. Errors are a function of poor analysis of behavior, a poorly designed shaping program, moving too fast from step to step in the program and the lack of the prerequisite behavior necessary for success in the program.

Errorless Learning

Errorless learning is a term used to describe a teaching approach that limits incorrect responses by means of carefully arranged teaching conditions. Terrace (1963) researched errorless learning with a successive discrimination task. In the traditional successive discrimination procedure (different than Terrace's procedure), a pigeon, for example, is reinforced with food for pecking a disk on the wall of an operant chamber (called a key light or key) when it's illuminated red. After many repetitions, when the pecking behavior in the presence of the red key is well established the color of the key changes to green and pecking is no longer reinforced. With the standard protocol then, the red light is the discriminative stimulus (SD) that cues pecking for food reinforcement, and the green light is the stimulus delta (S Δ) that signals the extinction condition, i.e., pecking will not produce food reinforcement. The red and green keys are then alternately presented with the corresponding reinforcement and extinction conditions in effect. After initially making many errors (due to response generalization), the correct differential response to key color gradually occurs (Pierce & Cheney, 2013).

Alternatively, Terrace used two procedures in his errorless discrimination training not typical of standard discrimination training. First, the S Δ condition, the green key, was introduced very early in the program before pecking in the red light condition was well established. Second, Terrace used a fading (i.e., fading in) procedure to present the green key at different values, gradually increasing brightness, wavelength and duration over the repetitions. These two procedures resulted in faster learning of the discrimination and very few errors. The pigeons trained with the errorless discrimination procedures made about 25 errors (i.e., pecking the green key light) compared to 2000 to 5000 errors made by the pigeons taught with standard procedures. Only those birds trained with T&E exhibited emotional responses in the presence of the S Δ. The pigeons trained with the errorless approach remained calm until the red disk, the SD, appeared.

These findings have been widely replicated across species. Powers, Cheney, & Agostino (1970) found that preschool children taught a color discrimination with errorless learning procedures learned faster and with fewer errors, and they enjoyed learning more than the children taught with standard procedures. Roth reported similar results with dolphins (as cited in Pierce & Cheney, 2013).

More Than a Protocol: A Mindset

Terrace's errorless discrimination protocol, which includes early presentation of the S Δ and fading in the discriminative features of the S Δ, is one important way in which we can improve learning outcomes. But, there is a bigger picture to be considered by having an errorless mindset. Simply put by Rosales-Ruiz (2007): We also know that what makes possible the exclusive use of positive reinforcement is the program. Every time that we find ourselves correcting or waiting too long for the response it is time to reconsider the shaping program (p. 6).

In other words, the rat is never wrong, it's the program. The errorless mindset is one of taking responsibility for reducing errors, which is in our power to do. Behavior is always conditional. Behavior never occurs in a vacuum. Knowledgeable, skilled and creative arrangement of antecedents and consequences is key to reducing errors and increasing efficient, effective, and happy learners. Below are some examples of using antecedents, consequences, and several procedures with an errorless learning mindset.

Antecedent Influences

Antecedent influences are those stimuli, conditions and events that set the occasion for behavior to occur. The overlapping categories of antecedent influences are briefly discussed below.

Setting events

Not all antecedent arrangements are learning solutions. Changing physical setting features in the training environment can make the right behavior easier. Sometimes it is as simple as removing the cue for the error and adding a cue for the correct response. For example, in 2015 Pella Shades launched a media campaign demonstrating the value of setting events. By lowering his Pella window shade, the caregiver reduced his dog's incessant barking as people passed by (LoveThatRebecca, 2015). Arranging substrates for ease of movement, expanding entry and exit doors, keeping food reinforcers tucked into pouches instead of visible in hands are all examples of arranging the setting for success.

Motivating Operations

The strength of reinforcers isn't fixed, it's conditional, i.e., reinforcer strength waxes and wanes depending on circumstances. Motivating operations are anything that establishes conditions that change the strength of a reinforcer. When daily diet is freely available it may be less motiving to work for so we train with special treats; when a behavior is cued by an unfamiliar trainer, responding may be less motivating so we encourage relationship building first, by means of depositing reinforcers in the reinforcement bank account. At Cheyenne Mountain Zoo, the trainers increased the value of going home by putting sticks on the beaver's path.

Discriminative stimuli and prompts

Pairing SDs with strong reinforcers results in clear cues. We can't reinforce a behavior that never happens so prompts can be used initially and then faded out in order to transfer stimulus control to the SD alone. Prompts can be verbal, visual, and gestural and includes food lures and modeling. Prompts can be used in a least-to-most approach or a most-to-least approach, depending on the situation. The least-to-most approach is useful for assessing current skills, i.e., what the learner can do independently or with minimal prompting. Fading too fast or (more commonly) too slow can be problematic (MacDuff, Krantz, & McClannahan, 2001). Target sticks are frequently used prompts that can be quickly faded after a few reinforced repetitions of the desired response. Reinforcer placement can prompt the correct response. Peta Clark, a talented trainer from Australia, prompts the bow position by delivering the food reinforcer slightly under the dog's chest and then fades the prompt by gradually delivering the food in a more natural upright position.

Consequence Influences and Cool Procedures

There are many important characteristics to consider to maximize reinforcement. The fundamental characteristics of effective reinforcement include clear contingency, i.e., the dependency between behavior

and outcomes – best achieved with consistent reinforcement; and contiguity –immediate delivery often best achieved with auditory or visual markers like clickers, whistles and short utterances. Also, reinforcer type, quantity, novelty and variety can influence motivation and outcomes.
The training procedures we use and our expertise using them are an important source of reducing errors, frustration and aggression. Some of the sharpest procedural tools for replacing problem behavior and teaching new skills are shaping, differential outcome effect, differential reinforcement of alternative behaviors, and behavioral momentum.

Shaping

Shaping is the process of reinforcing successive approximations of a desired behavior. Shaping allows us to train behaviors that may never occur otherwise. Chance (2009) describes five tips for successful shaping: First, reinforce small steps. Trainers who get poor results often require too much at once. Second, provide immediate reinforcement the instant the desired approximation occurs. Third, deliver small reinforcers, just enough to be effective without slowing pace. Fourth, reinforce the best approximation available, rather than sticking to some pre-set plan. Fifth, back up when necessary to progress more rapidly to the final goal (p. 141). The trainers at Zoo Knoxville used shaping to teach their elephants the component parts of a voluntary blood draw behavior. Dog behavior consultant Lori Stevens uses shaping to teach walking then jumping through cavaletti rails to build body awareness and strength in dogs. Lori adds difficulty by shaping the number, height, and distance between the rails.

Differential outcome effect.

With the differential outcome effect, the reinforcer varies systematically with the behavior. For example, browse reinforces shifting into the yard, and carrots reinforce returning to the barn. The differential outcome effect has been shown to be a robust phenomenon that can speed learning with a wide variety of species, learning objectives, and reinforcers (see for example, with horses, Miyashita, Nakajima, & Imada, 2000). At the Oakland Zoo, Senior Keeper Amy Phelps and consultant Lisa Clifton-Bumpass explored the differential outcome effect to teach giraffes to place their feet in the center of a radiograph plate. Foot placement anywhere on the edges of plywood mock-up produced lettuce and foot placement directly in the center of the mock-up produced banana slices.

Differential reinforcement of alternative behaviors.

Differential reinforcement of alternative behaviors answers the question, "What do you want the animal to do instead of incorrect or inappropriate behavior?" Trainers at the Columbus Zoo reinforced an Asian small clawed otter for holding a block, an incompatible alternative to grabbing the target they were using to prompt an open mouth behavior. Trainers at San Diego Zoo reinforced a male lion for laying down, an incompatible alternative to aggressive behavior at the shift door.

Behavioral momentum.

Based on Nevin's work, Mace et al. (1988) described behavioral momentum as "the tendency for behavior to persist following a change in environmental conditions" (p. 123). Mace developed a corresponding intervention for non-compliance that consisted of delivering a sequence of cues with which the subject was very likely to comply (high probability requests) prior to delivering the low-probability request. Momentum-like effects were shown. The antecedent high-probability cue sequence increased compliance and decreased compliance-latency and task duration. Ken Ramirez from the Shedd Aquarium and Karen Pryor Clicker Training, uses behavioral momentum as a key feature in his response to missed cues following a short withholding of reinforcement with sea lions, beluga whales, otters, and other animals.

Get Real

On this planet it is neither realistic nor necessary to experience no errors whatsoever when learning

new skills (which is another way of saying we don't need every response to lead to positive reinforcement). We are resilient and can bounce back after mistakes, even learning from them and enriched by them, given an empowered learning history that is rich with successes. After all, even the pigeons taught with Terrace's carefully orchestrated errorless discrimination technique made errors. But the T&E group made between 80 to 200 times more errors and were the only pigeons to show frustration and aggression. Clearly, reducing errors is a worthy goal, which leads to the question, how many errors is too many? If only there was a simple, single answer. Perhaps the question is better framed as, how would we know what is too many errors for any given individual? What's the measure? The answer lies in reading and heeding an animal's body language. Large and small changes in tails, eyes, fur and feathers are messages in the conversation we should be having with animals. Latency responding to cues, too much or too little focus, and response intensity also provide information about how many errors are too many for an individual learner. Further, problem behaviors, including repetitive and self-injurious behaviors, may have an escape function (negative reinforcement). That is, problem behaviors may be performed in order to remove aversive conditions like the demands of largely unsuccessful training sessions, i.e., too many errors.

Also, it is interesting to note that some research suggests Terrace's errorless discrimination procedures may be most useful in situations where the contingencies are fixed (as is the case with many trained behaviors) rather than changing. With problem solving situations with frequently changing contingencies that depend on eliminating incorrect responses (e.g., search and rescue dogs), traditional T&E procedures may result in more flexible responding and allow better remembering and recall (Pierce & Cheney, 2013, p. 239). More research is needed to discover the interaction between training procedures and different operant classes of behavior.

Conclusion

Trial and error training approaches typically result in high rates of errors and low rates of reinforcement – the perfect recipe for unwanted fallout. Learners practice errors making correct responses less likely in the long run and often show frustration, aggression or just give up. Trainers too can be similarly demoralized by their animal's slow learning curve and the frequent withholding of reinforcers that results from incorrect responses. The operant training toolbox is full of alternatives that differ from trial and error learning because they provide ways to guide learners to reinforcement. One alternative to traditional trial and error training is Terrace's successive discrimination procedure, which has come to be known as errorless learning. However, errorless learning is more than a set of procedures. It is a mindset that encourages trainers to take responsibility for their learner's outcomes resulting in more carefully and creatively arranged environments and training plans. With the errorless learning mindset, animals in human care will experience higher levels of success, which will greatly improve their welfare.

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Assisted Reproduction Using an Alternative Approach to Artificial Insemination in Cheetah

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African Lion Safari

Assisted reproduction has great potential to overcome management challenges such as behavioural or physical incompatibilities in zoo felids. Unfortunately, artificial insemination in felids rarely has a high success rate. Historically cheetahs are artificially inseminated by depositing semen collected by electro-ejaculation directly into the uterus surgically while under anesthesia. This method requires a high level of expertise that is not always accessible at all facilities. By using positive reinforcement training techniques, African Lion Safari is pioneering a new approach to artificial insemination in cheetah. It is our goal to perform artificial insemination so that it more closely resembles a natural breeding event without use of sedation, electro-ejaculation or surgery.

Background

Cheetah (*Acinonyx jubatus*) suffered a population bottleneck after the last glacial retreat resulting in a global cheetah population with low genetic diversity. Poor sperm quality, susceptibility to disease and kinked tails are only a few of the ramifications that have been linked to the reduction of cheetah's genetic diversity (Menotti-Raymond and O'Brien, 1993). The Cheetah Conservation Fund states "ensuring that the low levels of genetic diversity in the world's cheetah population do not decrease further is vital to the survival of the cheetah."

Genetic diversity in a population is lost each time an animal dies or does not successfully breed and pass on its genes. Unfortunately, cheetah is a species that does not always breed well in a captive environment. Only approximately 20% of the population of cheetah in North American Association of Zoos and Aquariums' accredited facilities have ever reproduced (Grisham, Lackey & Spevak, 2013). Population management for cheetah may therefore realize great advantages from assisted reproduction (AR) as it has potential to ensure that valuable genetic material is preserved and passed on.

African Lion Safari has been fortunate to have had a very successful natural cheetah breeding program over the last 15 years which has seen close to 40 births. In 2014, our collection was comprised of 3 females and 10 males ranging in age from 4 to 10 years old. Numerous attempts at natural breeding throughout the spring and summer did not result in successful breeding. The younger cheetah had no previous breeding experience and the older males only exhibited aggression towards the females and showed no interest in breeding. We therefore started to look at AR, specifically artificial insemination (AI) and enlisted help from reproductive physiologist Dr. Laura Graham, University of Guelph, Ontario, WRG Conservation Foundation.

Current Methods of Artificial Insemination in Cheetah

Over the years much research has been done to establish a successful method of AI in cheetahs. The most commonly used method is reported to have a 46% success rate when using fresh sperm and 27% when using frozen sperm (Howard & Wildt, 2009). Essentially four steps are involved (Howard, Roth, Byers, Swanson & Wildt, 1997). Cheetah have irregular estrus cycles that are difficult to detect without the presence of a male so an injection of equine chorionic gonadotrophin (eCG) is administered to the female to promote an estrous cycle and stimulate ovarian follicular development. Cheetah are induced ovulators, meaning they require the stimulation of breeding to ovulate, therefore, the female is administered a second injection of hu-

man chorionic gonadotrophin (hCG), 80 hours after the eCG to induce ovulation. Within 43 to 48 hours after the hCG injection, the male is anesthetised, semen is collected by electroejaculation and then processed for AI. Finally, the female is anesthetised and the sperm suspension is surgically inserted directly into the uterine horn through the abdomen. This method requires precise timing, specialized equipment and an individual or team with a high level of expertise and therefore posed some challenges for us.

Challenges

The first challenge we identified was with the sperm collection. Cheetah generally produce sperm characterized by many abnormal forms and relatively poor viability (Howard et al. 1992). The challenge we faced was that we did not know which of our males if any, had viable sperm. Also, in order to optimize our chance of success, we wanted to use fresh sperm as the viability of semen is decreased by the freezing process. Given this we would have to sedate and electroejaculate the males twice, once to check the viability of their sperm and a second time to collect sperm for insemination, therefore increasing health risks associated with two anesthesia and electroejaculation procedures.

The second challenge we faced was the insemination. We did not have the equipment nor the expertise to perform a surgical insemination directly into the uterus. Past attempts of intra-vaginal inseminations in anesthetized cheetah have not been successful. It was found that sperm transport through the reproductive tract was poor in anesthetized felids, probably due to reduced uterine horn contractions caused by anesthesia (Howard & Wildt, 2009; Wildt et al. 1987). Timing of insemination can pose an additional problem. Ideally, sperm should be present when ovulation occurs but it has been shown that anesthesia prior to ovulation can compromise the release of the ovum (Howard & Wildt, 2009).

Goal and Objectives

These challenges led us to the following goal: to pioneer a new approach to AI in cheetah by using positive reinforcement training techniques to eliminate the use of sedation, electroejaculation and surgery. We had two objectives to achieve our goal: 1) To develop a system to safely and effectively collect semen from male cheetah through manual stimulation and an artificial vagina (AV), and 2) To develop a system to safely and effectively perform intra-vaginal insemination on female cheetah without sedation.

Animals

A total of six hand-raised males were trained for semen collection. They ranged in age from 4 to 6 years old from five different litters. Three of the 6 males were group housed with the other three housed individually but adjacent to each other. Three hand-raised females were trained for intra-vaginal insemination. They ranged in age from 4 to 6 years old from three different litters. Each female was housed individually, adjacent to each other but separate from the males.

Safety

All training was to be done free contact without restraint, which required us to address some safety concerns. In order to maximize safety during each training session we employ the following measures: All training sessions are done with a minimum of two people. We have four staff on the cheetah training team. For this project the quality we needed was trust, between team members, but also between trainer and cheetah. Staff that were chosen all rotated to fill the role of carnivore supervisor and worked with the cheetah on a daily basis.Trainers always have access to bear guard and a cane which offer some physical protection in a free contact setting. Most importantly all sessions are conducted on a completely voluntary basis for the cheetah with no forced participation. All training took place either in the exercise yard or in the house where the cheetah had access to two exits at all times and the cheetah was free to leave at any point during a session. This measure in particular ensured that if the cheetah was not at ease or unsure for any reason it could choose to leave instead of resorting to aggression.

Training

We developed a plan by breaking down our objectives into a number of goals and although our goals were the same for all the cheetah our methods allowed for variation. As each individual cheetah is unique and would vary in response to training, we constantly evaluated each cheetah on an individual basis and altered our methods accordingly when required.

Our first goal was to spend time with the cheetah either in their house or exercise yard in order to build on the trust and relationships between cheetah and trainers. Initially when we started these sessions the trainers always approached the cheetah. At the point the cheetah started seeking the trainer's attention when we entered the pen we moved to the next goal. All cheetah needed to be accustomed to being handled so we began desensitizing all males and females to touch on all different parts of their bodies. Once they were comfortable being touched and handled, we started to desensitize them to anything that we thought may act as a distraction. This included a variety of things such as clippers, cameras, noise and having other people watching or present in the area. For these steps in the training we used tactile stimulation for reinforcement.

When the cheetah were no longer being distracted, we enhanced our ability to communicate with the cats by target training them using meat for reinforcement. Our goal then became manual stimulation with the males and catheter training with the females. We did not want food to be the focus so we reverted back to using tactile stimulation as reinforcement. In the first few sessions, because the animals were not restrained in any way we found they moved around too much. A simple wooden chute was built to localize the cheetah's movements to a more confined area. This chute is not meant to restrain the cheetah as it is a height they can easily jump or back out of, but it lets them know where we ideally want them to stand.

The chute worked great for the females, with the use of meat for reinforcement they stood very well. We progressed very quickly and within a few weeks all three females were trained to accept catheter placement in the vagina. The chute however, did not work very well for the males. As soon as we started any manual stimulation they chose to leave the chute so we quickly changed our strategy with the males. The males we were working with were all younger cats with no previous breeding experience and had no idea what we wanted them to do. Every time we started to stimulate them they moved away so we needed something else for them to focus on. We started using a variety of treats they had to lick out of a bowl. This successfully kept them standing still and allowed them to be stimulated to achieve erectile function.

Next we introduced the artificial vagina (AV) which was accepted by all the males without any issues. With the AV introduction we started seeing a variety of reactions from the males with regards to positioning and excitement. Reactions ranged from lying down, to squatting to looking for something to breed. Therefore, two different mounts were built, one, that allowed the cheetah to lean against or grab onto for stability and the other one allowed the cheetah to mount it.

Collection and Insemination

We began this project in November 2014 and 3.5 months later we collected our first successful ejaculate. Over the next month we successfully got ejaculates from all six males. In the beginning it could take anywhere from 15 to 30 minutes to collect an ejaculate if we were successful. By April 2015 we were able to consistently collect semen from all six males on a regular basis. Today this procedure generally takes about 15 minutes.

In the summer of 2015, we attempted our first AI procedures. Each female was injected with 200 IU of eCG to induce estrous. After 84 hours each was injected with 0.4 mg of porcine lutenizing hormone (LH) to induce ovulation. We then performed two inseminations; one 24 hours and one 36 hours after the LH injection. Although the insemination procedures were successful no pregnancies resulted which we attribute to our hormone protocol as it did not successfully induce estrus and ovulation.

In January 2016 we performed another successful insemination procedure. We altered our hormone protocol by administering 250 IU eCG and 1.0 mg LH but used the same time line. Endocrine analysis indicates that the new hormone protocol was successful in inducing estrus and ovulation. However, again no

successful pregnancy resulted. We have attempted a subsequent insemination and results are pending. If we again successfully induce estrus and ovulation without pregnancy we will consider altering the timing of our insemination after the LH injection.

Discussion

AR including AI, in vitro fertilization, embryo transfer and cryopreservation of sperm and embryos has great potential to help overcome some of the management challenges in zoos. Stress to animals due to transfer and relocation could be eliminated if we only moved genetic material rather than the entire animal. Cryopreservation of genetic material allows for long term storage and future reintroduction of genes into a population. In addition, these techniques can also be used to eliminate behavioral or physical incompatibilities between pairs. Our ultimate goal of this program was to achieve a pregnancy in cheetah through AI. With animal health and welfare our first and foremost consideration, now our goal is to alter the current surgical method to eliminate some of the health risks associated with AI. By not having to anesthetize the cheetah and by having them volunteer for procedures we are able to perform inseminations that more closely resemble a natural breeding event. If we are able to develop a successful intra-vaginal AI technique for cheetah perhaps eventually it could be adopted for other felid species.

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Training our Badger Well: A Badger's Battle with Pneumonia

Sharon Clay and Adrienne John

Turtle Bay Exploration Park

As animal trainers, one of the most important things is knowing your animals' behaviors inside and out. Seeing any change of behavior can indicate many things from: natural behavior, discomfort or comfort in everyday activities, to major health issues. These changes may be very obvious or incredibly subtle so taking any of them for granted can lead to an unfortunate outcome.

In the fall of 2014 knowing what subtle behaviors our American badger showed became a life or death situation as he was diagnosed with pneumonia. What could have been dismissed as natural torpor behavior turned into a long struggle to bring him back to good health.

This paper will discuss the process of diagnosing our American badger, Digger, with pneumonia, the effects of being in torpor, the long process to recovery, the difference training made in his extensive treatment and his resulting behaviors today.

Weight Management Is Not a Four Letter Word

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National Aviary and San Diego Zoo

Weight Management: There is a lot of discussion currently about the pros and cons of using weight management in animal training. We have heard the critiques: "Don't starve the animal, feed all the food every day, don't rely on weight to get behavior" and so on. Weight management, done correctly, is one of many tools in a trainer's toolbox. We want to focus on the benefits of using weight management and enrichment to maintain animal health throughout its life in captivity. By carefully balancing body scoring, proper diets, behavioral observations, and monitoring seasonal trends, you can keep your animals in a state of proper welfare, optimum health and receptive to training and enrichment. This paper will cover scenarios in which weight management, regardless of training goals, has benefited animals in captive husbandry settings.

As animal care professionals, we are responsible for the entirety of our animals' physical and mental health and wellbeing. When making decisions about our animals' care, we generally look to the wild to inform our decisions for what is best. Using the wild counterparts of an animal as guides, we know based on years of study that a large portion of the day is spent foraging for food or hunting. While we cannot duplicate this type of activity budget exactly, we do know that providing more food than an animal can consume in one sitting is a situation rarely if ever encountered in nature. Even though we cannot reproduce the wild, we need to use nature as a guide for their life in captivity.

In the wild, animals have to work for their food through activities such as climbing, hunting, swimming, and flying. Free meals are not sitting around all day waiting to be eaten. Predators need to hunt and are not always successful. Foragers need to travel distances to eat. Competition is natural in the wild. Weight management can be a tool to increase activity as well as decrease obesity and the problems associated with it.

The term weight management is actively managing the overall physical health and wellness of an animal by managing diets and activity levels while increasing the perceived value of food while maintaining the animal's healthy body condition. It is more about following a natural attitude for food than dieting or dropping an animal's weight. Animals are given opportunities to work for food, something that they would have to do in the wild. If an animal is obese, it may need to drop weight by increasing its activity levels and decreasing unhealthy body fat. This increases its overall health as no animal should be obese. If weight management is done well, you can have your animals at healthy weights and eating healthy diets.

Weight management is not just about weight, but is also about diet. Having food available at all times does not ensure that your animal is going to be at a healthy weight. We need to look at activity budgets and caloric intake. Weights on the scale should also be paired with body conditions. Knowing weights and corresponding body conditions can help prevent illness as well as catch them before they become serious.

With the differences in how many times a day an animal eats, as trainers we have to consider this in our training programs. For example at the National Aviary, because a parrot eats throughout the day in the wild we spread out their food during the day while they are in a training program. We weigh them for treats first thing in the morning, and then give them their fruit and vegetables in a bowl a little while after. They do a training session in the morning for some of their pellets and nuts. In the afternoon they do another

training session and any food not given will be hand fed at end of the day. However, they never have a bowl of food sitting in the enclosure all day. Even though we are technically weight managing them, most of our parrots weigh the same as when we are not working them, though some do come down in weight. We monitor our parrot's weights and diets when they are not working because they can become obese during their non-working seasons. Using weights during non-working seasons and adjusting diets accordingly can help to solve this issue.

While we need to spread out food throughout the day for parrots, birds of prey are not foragers and typically will eat once a day if they find prey that satiates them. We will feed them typically 1-2 times a day because of their hunting style. Like parrots, during non-working times we monitor their weights as well as their diets.

Birds of prey spend so much time finding food in the wild. In captivity when they do not have to hunt, they tend to become obese. We can use weight management to increase their activity level by having them train for their food. Most birds of prey are not social so use of food is a way to increase activity level and maintain good body condition. This can reduce their stress level and makes them more comfortable as ambassador animals that are willing to participate in sessions.

When you take an animal into a new situation, using operant conditioning techniques with food as the primary reinforcement is key. If there is not an interest in food in the new environment, the animal becomes habituated over time due to flooding. If an animal is working for food, it can make the animal more comfortable and less stressed quicker as opposed to just flooding it in new situations.

An animal's interest in food can make medical care a less stressful situation as well. If a positive relationship is established through proper weight management, it can be used to voluntarily give medical exams, nail trims, injections, and bandage changes.

Hand raising an animal may seem like an option to have an animal that is comfortable around people and novelty as you can take it places from a young age to get used to everyone and everything. However with some species, this can become problematic at sexual maturity due to aggression and breeding behaviors. Some hand raised animals do not breed with their species and cannot be housed with other animals. It also does not guarantee that the animal will not have obesity problems.

Something else to take into consideration in weight management is that every animal is an individual. All animals regardless of species have different metabolism as well as size, weight, and body condition. There is no magic number. For example the National Aviary has five Black Kites who range from 750-1100 grams. Though some of the variance in weight has to do with the sex of the birds, there is a wide range of weights among the male as well as the females. We have our vet get body conditions on each of them to maintain healthy weights on the individual, not a range for the group. We keep a database of the animal's weight, body condition index (BCI), and time of year as body condition and weight can change seasonally. Two animals can be the same weight and be very different health wise.

One of the reasons the National Aviary chooses to weight manage our program animals is to limit health problems. All animals can suffer from health problems such as joint issues, foot problems (including bumble foot), heart disease, and reproductive issues.

There are case studies of health problems and how weight management helped fix them. At the National Aviary there is 1.1 American Flamingos in the education department. Piggy the male flamingo was obese since he was hatched. He developed a foot issue (tarsal abscesses) which required intense medical care including having to be restrained on a daily basis to treat medical issues with his feet and joints. The medical issues also required him to be on injectable, oral, and topical medicines as well. This can be a very stressful situation for any animal. Through weight management and training, Piggy has shown significant improvement in his overall health. He weighs voluntarily on a scale every morning for a portion of his diet. We write a diet daily to keep his weight at a good body condition. We then do multiple training sessions throughout the day using his food to walk him out for shows and education programs. This helps increase his exercise. We also use food to treat his feet and legs when necessary so he doesn't have to be restrained for the medical procedures. By doing multiple things throughout the day, his activity has increased, he is

no longer obese, and we have seen a significant decrease in his joint and foot issues, overall improving his welfare.

Preston is an African Penguin. Typically during molting, African penguins do not eat or eat very little. Preston bulked up for the molt to build up fat storages which is typical. However, once he lost his feathers, he continued to eat the increased amount of food and became obese to the point where his identification band could not be put back on. For this reason, he needed to be weight managed to help him increase his activity to burn off the excess fat.

Why are frequent weights so important? If you know the weight of your animal, you can often use that to make effective training and medical decisions. Body condition is equally important. Having a baseline of body conditions and weight during all seasons can allow you to better care for your animals by avoiding obesity, see trends in behavior due to season change, breeding behavior, as well as catching other health problems sooner. Most mammals are weighed monthly at a minimum, if there are medical concerns the first thing we do is get a weight. Depending on the species, birds in free flight programs are weighed daily and others weighed weekly.

Animals generally mask their illnesses and by the time there are signs they are usually very ill. Knowing what an animal weighs versus body condition and food consumption has helped us catch that an animal is sick even before clinical signs become apparent. Knowing weights also can alert you to changes that are happening to animals' lives such as molting, lay eggs, mammal getting ready to hibernate, shed, breeding seasons etc. Another factor to notice is how the animal is eating; there can often be tooth or mouth issues that make it painful to eat. Being able to look into the mouth voluntarily is a great behavior to train, and can detect a broken tooth or infection.

At the San Diego Zoo "Cheka" the serval was still growing at 8 months old but was slightly overweight as well, it was decided a 10% decrease was in order to increase motivation and decrease his weight to a healthier target. On the third day of the decrease the lead keeper noticed he was chewing his food funny. He was eating the meat more in the front of his mouth and dropping pieces. After several observations it was determined he might have a tooth issue and was scheduled for an exam. Sure enough, he had some loose yet retained deciduous teeth that needed to be extracted. Luckily we didn't rely just on dropping food without continuing to observe for other issues.

At the National Aviary "Blanche" an Americauna chicken was losing weight even though she was eating her normal diet. With an increase in her diet due to her increased appetite, a body condition exam was evaluated. Her body condition did not match her normal weight and diet intake. She was given a physical exam by the veterinarian and Blanche had a gastrointestinal disease which was treated. We were able to catch it early due to our weight management program.

There are many factors to consider. There are seasonal factors that affect their caloric needs. Some factors include seasonal weather changes, hibernation, breeding/hormones, molting, and age. Seasonal temperature changes in temperate climates are a factor. The body takes in more calories to keep warm in colder conditions even if there is heat available than during summer months when you typically eat less. Certain species feel the need to bulk up for the winter; some will cache food or get more food aggressive. Knowing the natural history and applying seasonal weight trends can help you stay ahead of the game. Some animals naturally hibernate or go into torpor. Adjusting feeding and training schedules can set you up for success with a proper plan. Muscle building as animals become better conditioned will affect weight. Animals that don't have certain ability to build muscle like pinioned or clipped birds will have different expectations in muscle mass.

Our grizzly bears, while never truly hibernating in San Diego, go through a seasonal "shut down." The keeper works closely with our nutritionist and gradually decreases the food as she sees more left over food. This reduces waste and pest issues. Since they are brother bears that live together they will easily fight over food so she carefully watches their interactions and adjusts the diets accordingly. She then increases the diet as it warms up and sees their appetites increase.

Weight management is not taking an animal and dropping its weight. If an animal is obese, it needs

to lose weight for its health. There is no magic number to what an animal should weigh. Every animal is an individual and needs to be in good body condition. If an animal is obese, it will need to drop more weight than an animal that is not. It will also need to build muscle as it is most likely out of shape. Gradual decreases and increased enrichment opportunities can help achieve this goal without causing food aggression or a medically dangerous decrease in weight too quickly.

Apes are known for heart disease. Our gorillas were overweight and lacked muscle tone. Keepers, veterinarians, nutritionists, and our enrichment supervisors came up with a plan to reduce the biscuits in the diet while increasing filler food, like greens, and time spent foraging. Through some simple exhibit modifications the gorillas now had to work harder and longer for food by climbing, balancing, shaking, and picking through devices. With social dynamics, you need to make sure everyone can get a chance at food items and spread the diets and enrichment out to reduce possible aggression. Our male at San Diego silverback has since lost 60 pounds and gained nice muscle tone. He is also been trained for cardiac ultrasound to monitor his heart.

Fennec Fox often want to cache food for the winter. Their small stature can easily gain and lose weight very quickly. Through seasonal weight trends we try to stay on top of their needs by gradually increasing right before winter and then decreasing when the weather warms up. This along with regular weights and good records on behavior can help prevent food aggression and lack of motivation to allow trainers to continue to use the animals for programs year round.

Whether your animal is in a training program or not, as an animal care professional it is your responsibility to ensure that your animal is at a proper weight and body condition. This improves animal welfare and avoids health issues throughout its life. Looking holistically at natural history, seasonal trends, body size, behavior, social structure and medical aspects can give you a more complete process to make dietary decisions that is your animals' best interest.

It Takes a Village: Employing a Training Team System for Zebras at the Oakland Zoo

Leslie C. Storer

Oakland Zoo

In order to manage the Oakland Zoo's small herd of Grant's Zebra (Equus burchellii boehmi), we actively involve zoo staff from across the departments, from the director to the newest volunteers, in coordinated team-training sessions. Utilizing individuals with varied levels of expertise comes with challenges and benefits, but has ultimately allowed us to expand the zebras' repertoire of trained husbandry behaviors in a way that would not have been possible with a single keeper. These behaviors include, among others, being comfortable in close proximity to and taking food from strangers, shifting on and off exhibit at random times, stepping onto a scale, and entering a stall alone. In addition, the training team system has broadened the knowledge, experience, and confidence within zoo staff by giving those with less training experience the opportunity to hone their skills, as well as experienced staff the chance to refine their consulting and troubleshooting abilities. We continue to use this training team system to prepare for future events with the zebras, including physical separation, injection, and dental radiographs.

Husbandry training is top priority in the animal care industry. If you are caring for a social animal, chances are very good you are caring for a group of individuals. This is hardly a problem if you have unlimited access to resources such as time, money, and expert staff. This is not reality for most institutions. We are all doing the most we can with limited resources. At the Oakland Zoo we employ training-team programs to provide an individual the assistance required to manage multiple animals in a way no single keeper could. Key elements of a successful training-team program include planning, communication, resource management, and creativity. I will use our Grant's zebras as my primary example.

At the Oakland Zoo a Supervising Primary (SP) keeper is responsible for managing a single string, which is comprised of several animals and, typically, multiple exhibits. The SP keeper is assisted by, on average, one to two volunteers or unpaid interns on a daily basis. A Relief keeper, trained to cover multiple strings, works with the SP keeper, on average, one day per week and covers the string on the SP keeper's two days off. A Floating keeper, also trained to cover the string, works with the SP keeper on average one to two days per week and occasionally covers the string. On a given day, the average number of individuals responsible for a string, including volunteers, is 2 - 3.

It is possible to maintain the minimum husbandry needs of feeding and cleaning as a single keeper. However we highly emphasize the psychological well-being of the animals in our collection through our behavioral enrichment program, which includes positive reinforcement-based training. It would not be possible to meet daily goals of our enrichment program were it not for the help of our volunteers and support staff. Like many institutions, we employ volunteer help for the time consuming and sometimes tedious tasks involved in cleaning and providing behavioral enrichment for our animals.

Trying to manage a group of four animals during a training session with 2 - 3 inexperienced but hard-working volunteers is challenging. All four animals might be soliciting attention, and a green trainer would likely not have the skills to make appropriate training decisions. This is where the community-oriented culture of the Oakland Zoo comes in.

Multiple staff members from around the Animal Care, Conservation, and Research (ACCR) department participate in our training-team program, and we find this beneficial on multiple fronts. More expe-

rienced staff is paired with less experienced staff, so one can mentor while the other learns. Staff from a different string can expand his or her scope of experience. Staff from different strings provides a novel perspective on a given situation. Multiple brains with varied experience help when troubleshooting or brainstorming. The current team of zebra trainers has experience training equids and other hoofstock, other mammals, birds, and reptiles. The current team has experience working with both social and non-social animals and both domestic and exotic species. The human resources tapped during any one session can range from the director of ACCR to new volunteers.

The culture of sharing human resources is not limited to participating on the training team. There are numerous cases where a staff member on one string acts as a consultant on another string. One staff member might have a significant amount of experience in a certain aspect of another animal's care or a staff member might have just attended a conference and have ideas that can be applied somewhere other than their assigned string.

The training of an individual animal in the group is managed by a primary trainer. The primary trainer could be the SP or another keeper. The primary trainer is supported by and responsible for managing a subset of keepers that function as back-up trainers or consultants.

Scheduling helps to keep the whole machine moving forward. Three times a week we conduct training sessions in the early afternoon at set times. These sessions have become routine parts of our week. The afternoon sessions are often performed on exhibit when the zoo is open, so the guests can see the activity. This also gives us an opportunity to interact with guests. The length of the session, often around 5 minutes, is ultimately determined by the trainer/animal teams. Each trainer/animal team works independently of the other while on exhibit. When any trainer feels their animal's behavior dictates he or she should end the session, that trainer communicates his or her intentions to the rest of the team. This is a signal to the other trainers to wrap up their sessions. This is important, because the exhibit is an open space with nothing preventing one animal, whose session has ended, from coming over and interfering with another animal's training session.

We work on separate but related behaviors in the off-exhibit barn. These sessions often happen in the morning before the zoo is open or as priority dictates and are scheduled the morning of or the day before. Barn sessions take on a slightly different format for the team. All of the trainers need to work together to send a specific animal to a specific area of the barn (for example, the scale), while the others remains at their station. Each zebra has an assigned station in the barn from which he or she is sent and to which her or she returns for reinforcement. The sending and receiving of zebras around the barn requires verbal communication amongst all trainers due to the walls and corners around which we must work.

Before each session, the trainers discuss their plan for the session. After each session, we discuss the results of session. Because it is unrealistic for primary trainers to attend every training session due to schedule conflicts, members of an individual animal's training team will occasionally run a session. Primary trainers conduct meetings, as needed, outside the training session time to make sure the members of each animal's team are all working towards the appropriate goals. The four primary trainers came together for perhaps one of the most valuable meetings to share their animal's catalog of behavior including to what degree the behavior was established. We standardized cues and titles for current and future behaviors and organized all behaviors into three tiers of increasing priority. The three-tiered priority list of behaviors is a system applied throughout the zoo. The priority of a behavior is determined by husbandry needs.

Many of us have to operate on a limited budget, and must "make do" with what we have been given. For this reason creativity is essential. It would be nice to have the perfect exhibit and holding area. It would be nice to have an extensive team of experts with unlimited time. This is not reality for most of us. However one is only limited by one's imagination. We cultivate an environment in which all ideas, no matter how bizarre, can be expressed. Out of necessity, we use techniques that allow us to include both the experts and the novices we have available. A primary trainer will work on challenging behavior while a volunteer or intern maintains a well-established behavior. We must be creative when thinking of ways to best utilize our facilities as well. We ask the zebras to accept working in an awkward barn space by using smaller approxi-

mations and acknowledging that it might take longer than if the space were ideal.

When I began to work with the Oakland Zoo's Grant's zebras, our population consisted of "Bingo," the eldest mare born in 1991, her son "Domino," (a gelding) born in 1994, Bingo's daughter "Jumoke," born in 1996, and "Stormy," an unrelated female . A predecessor, Julie Hartell-DeNardo, laid the foundation for our current zebra training program several years prior to my arrival when there was an additional fifth zebra. At that time the zebras had little to no experience with positive reinforcement training at first, but instead older, more aversive husbandry methods. Her initial goal was to teach the group to voluntarily approach the fence and take food from the hand. This progressed to the point where there was competition for proximity to the trainer, so she began to tap human resources from around her section of the zoo and later from the ACCR department. Today the group recall with a scatter feeding as opposed to hand feeding is the only behavior a trainer can conduct without outside assistance.

Primary trainers had been conducting team training sessions on exhibit, and the zebras became quite comfortable training on exhibit. Unfortunately the zebras were inadvertently conditioned to work only along a certain region of the fence and line up in a specific order. We gradually introduced variability to their routine, by changing the order in which they were lined up and moving increasing distances along the fence.

We continued to vary elements of the zebras' environment by conducting group feeding sessions, where the zebras were given the opportunity to take reinforcement from strangers. On a monthly basis, groups of about 20 adult volunteers come from various local organizations to the Oakland Zoo for a volunteer day. We started by giving the group very specific instructions on how to offer long pieces of carrot to the zebras. The keeper then rang a bell, by then a well-established recall cue. The groups all looked and acted slightly differently, despite the detailed instruction. The carrots offered were in addition to the regular diet. If a zebra chose not to approach the group, none of the regular diet was being withheld. They were only forfeiting items on top of the regular diet. The repeated opportunity for the zebras to choose to participate had been so successful that today the zebras start to approach the fence when they see a keeper de-briefing a large group of strangers.

The eagerness with which the zebras were willing to train on exhibit allowed me to focus without disruption on the eldest mare, Bingo, arguably the most reluctant individual. She had the longest history with older, aversive animal husbandry techniques, so, while her "target" behavior was strong, she did not allow any touching of her body. Over several months, she learned to lean both sides of her body on the fence and allow touching over her body. The relationship developed would be called upon in her final days of a sudden illness. Despite being clearly uncomfortable, she approached the fence and presented her body long enough for the vet to get brief listen of her lungs.

Bingo was the last animal of the four to walk over and later pause on a scale in the barn. We placed the scale in a short hallway that led from one stall to another. Browse or other supplemental treats were placed in the further stall. Since the items past the scale were merely supplemental, we again ensured none of the regular diet was withheld. Once all of the animals were comfortable walking over the scale, all of the trainers worked in concert to hold their animal at a specific station in the barn then send their animal when a trainer at the scale called them. In this case the trainer at the scale was managing the criteria for the behavior of each zebra. The current population of zebras all go to the scale when sent for regular monthly weights.

We are now preparing the herd for anesthesia supported physical exams. This requires the animal's willingness to walk into an isolation stall by themselves, allow a door to close, and accept an injection of an initial anesthesia in the rump. Domino, who is starting to show subtle signs of having difficulty eating, is the first candidate for a physical exam. While on exhibit Domino and I focus on a "lean in" behavior, "touch" and "leave." During separate sessions in the barn, we practice first going to the isolation stall alone and out of sight of the rest of the herd, then hearing and seeing a large, loud door closing. Once the behaviors are strengthened separately, we combine them. Today Domino is willing to be closed in the isolation stall for a poke with a blunt needle. While I focus on Domino, other primary trainers work on body positioning cues, desensitizing their zebra to being touch, and approximating their zebra to remaining calm while alone in the isolation stall.

We continue to progress all of the animals towards the current goal of physical exams, and, when these exams are completed, we will work towards the next goal and re-evaluate our priorities. The training-team system has been a learning experience and an exercise in patience for all individuals, both zebra and human. Good communication, consistency, and Oakland Zoo's strong sense of community help to keep the system moving towards two goals: 1) sound zebra husbandry, and 2) personal growth.

Posters

Tipping the Scale: Arising to Challenges in Weighing a Tiger

Catrena Firth

Cheyenne Mountain Zoo

Animal care professionals typically consider husbandry behaviors such as scale, target and body presentation to be relatively easy behaviors to train. However, this case study at Cheyenne Mountain Zoo reminds us of the "study of one" and how even a "simple and easy" behavior can present training challenges to both trainer and trainee. In this particular scenario many barriers arose that the primary trainer and several staff members overcame by constantly changing environmental factors, reinforcement strategies, and even primary reinforcers.

Zoya, a female Amur tiger, exhibited behaviors indicating an adversity to the board placed on top of our scale. She had a history of behavior that signified to trainers that the board had changed from a positive stimulus to a negative one. It was unknown as to why the stimuli had changed. What was known was that something in the environment and the board itself needed revision. Trainers looked at the board itself, its placement, and worked on bringing the stimulus from negative to neutral and finally to a positive.

When a roadblock is hit during training, there are plenty of ways in which to change the outcome of the situation. Eliminate labeling, change the environment or change antecedents, and reading the animal's behavior. By addressing the different possibilities and deciding what can be changed, difficult training situations can be worked through. This paper explores the changes that can be made when overcoming barriers; with a willingness to reevaluate constantly, success can be achieved.

Training animals hardly comes without its obstacles. Learning to read an animal's behavior is the key to successful training. Every training situation is different, and no animal can be treated or trained in exactly the same way. As Dr. Susan Friedman says, "The behavior of individuals is always the study of one. The key to changing behavior is changing conditions" (Friedman, Behavior Works, 2015). As animal care professionals, we think of some behaviors as basic and relatively easy behaviors to train. Zoya, an Amur tiger (*Panthera tigris altaica*) at Cheyenne Mountain Zoo, and her story of scale training truly shows this "study of one" philosophy. Zoya was the only big cat in the Conservation Highlands area of the zoo that wasn't scale trained; it wasn't for lack of trying. She exhibited behaviors that told us the scale and weigh board were aversive, and because of this keeper staff was not able to get voluntary weights on her. In 2013, Zoya received a breeding recommendation from the SSP and it became imperative for keepers to start getting weights on her to better manage her potential pregnancies. Considering that Zoya avoided the weigh board completely, her training plan needed reevaluation in order to figure out what could help change her behavior. With new ideas come new challenges, but with the trainer's and animal's willingness to change and work through those trials, barriers can be broken down. Zoya and trainers hit many obstacles, but the worked together to overcome them.

During Zoya's scale training, trainers relied heavily on antecedent arrangement to create a successful environment for her to train in. Antecedents are the stimuli, events and conditions that precede a behavior and set the occasion for the behavior to occur (Friedman, 2009). Antecedents set up every training situation and can dramatically affect the outcome of a training session. When Zoya's scale training started, she was not even entering the den that the scale board was in (figure 1). Our original scale board was a piece of thick plywood (6 ft. X 3 ft. 4 in.) raised about 4 inches off the ground. Trainers tried to bait Zoya to the board, but if she came into the

den, she was very cautious. Cautious behavior looked like being hesitant to enter the den containing an object, entering that space and moving slowly, looking around frequently and running out the space if any slight noise happened, or not even entering the den at all. Here is an example where labeling could inhibit animal training. While it would have been easy to label Zoya and say she was "lazy", "afraid", "unmotivated" or "untrainable", it could have potentially prevented trainers from analyzing Zoya's measurable behavior. Trainers could easily have just said, "Zoya's afraid of the board, guess we can't train her to get on the scale". However, trainers decided to break down all the barriers that come with labeling, and instead decided to analyze Zoya's behavior and think of what a successful training session would look like. Trainers started by looking at their current training environment and assessed its antecedents.

Figure 1

There were two obstacles that trainers needed to overcome from the start of this behavior. The first and largest, Zoya would not enter the den with the original board. Trainers decided to start over from scratch. Zoya would now be trained in a neutral area where she had never encountered the board before: the shift hallway. A new weigh board was created; it was a smaller, plywood board that fit in the shift hallway. The new board was also not raised in hopes this would help build Zoya's confidence with getting on a wood board. The second challenge was that Zoya had a lack of food motivation due to being slightly overweight. If Zoya wasn't motivated for food, our primary reinforcer had no value. To remedy this, Zoya's diet amount was decreased, as she would often leave food from overnight. She also was held to a strict plan of only receiving her food during a training session or through enrichment. That could mean a scale session or just a general husbandry training session with her established behaviors. This way, she would know food was contingent on "working" for it; she received no "free" food. If Zoya wasn't interested in training during a session the trainer would end it and her food for that session was added to the next day's diet where she would have the opportunity to work for it then. A consumption log was kept in order to keep track of Zoya's diet intake, and keepers created an environment during training that made sessions easy enough to earn food. Therefore, she never went more than 2 days without at least 50% of her diet. It didn't take long for her food motivation to increase and trainers were having more sessions where Zoya was interested in participating. With Zoya's increase in motivation and a new set up, scale training began in the shift hallway.

Changing the antecedents to better suit the animal's needs sets that animal up for success. Knowing that Zoya was cautious around wooden boards, trainers put the new scale board between two den shift doors (figure 2). This gave Zoya the ability to approach the board form either side and have a way to leave the board, no matter where she was in the shift hallway. She was given access to the hallway and she came over right away to inspect the board. After just a couple of sessions, Zoya would come and put her two front paws on the board. Every so often the board would shift position and Zoya would appear to lose confidence and need to take a step back in training. Trainers worked at this approximation for a while. It is important for an animal to feel confident at an approximation, but it is also easy for a trainer to stay in one place too long and not take the appropriate

steps to move forward when the animal's behavior tells you they are ready. In Zoya's case, the primary trainer worked on getting two feet on the board longer than was necessary. This was made obvious later in training, because Zoya was just so confident with two feet on the board, at times it was hard to move forward. Moving at the animal's pace was big lesson learned from this stage of Zoya's training. Zoya got to a point where she was coming into the hallway and putting three paws on the board. However, there were still setbacks and it seemed that the board sliding was the main cause. It seemed Zoya's confidence with the board was growing, but the movement would shatter what confidence had been built. It was clear that the board needed to be revised. Considering the antecedent arrangements during her sessions, trainers decided the board would be left in the same location, but that it needed to become more secure. Trainers decided to attach the scale bars to the board to weigh it down, which would result in it not sliding when her paws touched it.

Figure 2

In addition to securing the board, the scale bars raised the board back up. Zoya had a lot of history with putting two paws on the board, so getting her to this approximation with the raised board went pretty quickly in one or two reps. One challenge that was seen (almost right away) with the new set up was that if a paw was placed on the end of the board, the other end would tip up. Not only would the board move, but the noise of the scale hitting the ground was loud and caused caution on Zoya's part. This was not ideal, but trainers tried to work through this because she wouldn't step on the edge every time. Zoya would make progress and then regress when the board would move. This was an excellent and highly important lesson learned. If the antecedents are not right, you should stop a training session and assess the antecedents and change them into something that works. Trainers were posed with the question of how to keep the board secure, but also stop it from tipping up. They decided to add 2x4's, upright, to each end of the board. They filled the gap between the edge of the board and the floor, that way when Zoya stepped on the scale board, the 2x4's would stop the board from tipping.

With the board now unable to tip, Zoya made more progress with the board. Zoya's confidence grew and she was back to putting two paws on the board with no hesitation. The primary trainer would use her body as a prompt and this worked very well. This got Zoya to start walking over the board. This was the first time her whole body had been over the board. She did jump over it a couple times, but wouldn't get bridged and reinforced unless she was touching the board. Trainers tried to get her to walk slower on the board and eventually get her to stop. However, her behavior still showed she was uneasy with the board. She would rush over it to get off and she would only approach the board form one direction. The board still made some noise when she stepped on it, and it bowed in the middle between the two scale bars. Even though several antecedents had been changed, the board still wasn't quite right; reassessment was needed again. Since Zoya had a lot of history with a raised wooden board in the hallway, trainers decided to move back into the dens and use the original scale board, however, that board needed to be re-examined as well.

Trainers wanted to tackle Zoya's history with the original scale board in a completely different way. They

decided to move away from the wood board all together and try a heavy, black rubber mat. They wanted to station Zoya onto the mat as the first approximation, then would generalize the station on the mat to the original weigh board. Zoya, however, had other ideas. She went from the extreme of not coming into a den at all when the board was present to overly excited about the rubber mat. She would play with it and would be reluctant to shift away from it. Since Zoya had such a positive interaction with the rubber mat, trainers decided to use that to their advantage and bolted it to the board. This helped weigh the board down, covered the plywood, and give Zoya something she seemed to enjoy. The revamped board was placed in the den in the same positioning as before (figure 1). When she was given access to the board, Zoya would be able to come into the den and instantly step on the board. She easily started the approximation she had the most reinforcement history with: two front paws on the board.

Trainers had a hard time getting Zoya to come onto the board any farther. She would come in and get halfway on the board, then stretch out towards the mesh. Baiting was used to get Zoya farther onto the board, but it wasn't working; she was still hesitant. So, the board was turned 90 degrees (figure 3). This way, Zoya would be able to walk straight onto the board and not have to come in and turn to get her whole body on the board. Trainers wanted to make it as easy and as clear as possible. Zoya was baited on the board by placing food on it. First, meat was put on the board in different places, but Zoya would only go so far and pull the meat towards her. Next, trainers used long dowel rods with meat on the ends to reinforce Zoya. That way, she had to come onto the board before the reinforcer was delivered. When little progress was being made, a new idea was brought up: food is not always the only reinforcement used during training. If an object has a high enough value to an individual, they could train just as well to get that object as a reinforcer. Zoya's favorite enrichment item is a car tire, so it was put on the end of the board as a bait. The tire was made into an even higher reinforcer by smearing chicken on the side and in the tire well. Zoya was given access to the den and was interested in the tire that she walked on with all four paws. After a few reps with the tire, Zoya's confidence seemed to grow. After a few reps of putting all four paws on the board, she then completely bypassed the board and would pull the tire off from the side. She would reinforce herself by getting the tire and the couple pieces of chicken. To prevent this from happening again, the scale board was turned back 90 degrees to the original positioning.

Figure 3

Trainers worked hard with Zoya in this position again. At this point, she had several positive interactions with the board and her confidence had grown. This was ideal because it was the position in which the final approximation was planned to take place. Zoya quickly came onto the board with three paws; the fourth paw was still the hang up. Zoya was baited onto the lower left corner of the board. This was the furthest point from her and would encourage her to come all the way on to reach the chicken. She was making progress and moving the fourth paw closer and even raising it like she was going to step on. During one repetition, Zoya stepped on the board and put her fourth paw on; it was a very exciting moment! She got reinforced big for that fourth paw on

and ended up doing it two more times. The next morning, the den was hosed and squeegeed before training. Adding environment was not considered to be anything that would negatively affect training, but that ended up being the case. A very small amount of water added to the antecedents was not intentional, but the effects were definitely upsetting. Zoya came onto the board like the previous day, but one paw slightly slipped on a small wet spot. Zoya jumped off the board and wouldn't come near it again; her confidence was completely shot. Every session that followed this set back resulted in Zoya only putting one paw on the board and quickly pulling it off. Again, make all antecedents right before starting any session and if they are not, fix them and *then* train. With this new issue, trainers decided to try something new again. A different den had just opened up and it gave trainers a new way to position it and access to the board that wasn't possible before.

Den four has a small area that sticks out that no other den in our building has. Trainers used this space to their advantage. The board was placed with a majority of it in this extended space (figure 4). This allowed trainers to access the side of the board and gave them the ability to reinforce Zoya at different points on it. The other great thing about using this space was that Zoya was given the power to choose to come onto the board in her own way. Unlike before, she could be in the den without having to immediately step on the board to get into the den. Having this power would hopefully help her with building confidence to get on the board. Zoya would come into the den and inspect the board, and then started putting a paw on it. Trainers bridged when she did this approximation, but would reinforce her away from the board so she had the power to leave. A different reinforcement strategy was also started at this stage. Trainers did fewer repetitions per session, but paid out larger amounts than before. This would hopefully give Zoya the information that a little work equals a lot of food. This helped her motivation to get on the board increase. After several sessions, she was putting all four paws on the board. Trainers started moving the board further into the extended space, closer to the corner to make Zoya have to come farther on the board before getting reinforced. This worked for a few repetitions, but then trainers saw Zoya's cautiousness with the board return. If she got on the board with all four paws, she would quickly jump off to get away from it. Trainers were puzzled at this, because nothing had really changed; however, Zoya's behavior was making it obvious something wasn't working. The only thing trainers could think of that might be causing Zoya to become cautious again was the placement of the board into the corner. Trainers hypothesized that Zoya saw no escape route and didn't want to be walking into a blind corner, thus resulting in a more cautious behavior and unwillingness to get on the board. The solution that made sense was to move the board back out of the corner and give Zoya more room at the far end of the board.

Figure 4

Trainers learned a lot of valuable lessons during Zoya's scale training. Training is full of trials and errors. If you notice one step isn't working, go back to the last step where the animal was successful. For Zoya, this meant having the board pulled out to where there was about a 3 foot gap between the board and the wall (figure 5). Zoya could access the board from either side. During the first session with the board in this new position, Zoya

came in the den and walked right onto the board. It was exactly what trainers hoped for. She got reinforced heavily for this and did it for all the succeeding repetitions. The gap at the back of the board definitely made a difference to Zoya. From then on, every time she came in the den she would walk onto the board walk to the end and turn around and stand on the board facing away from trainers.

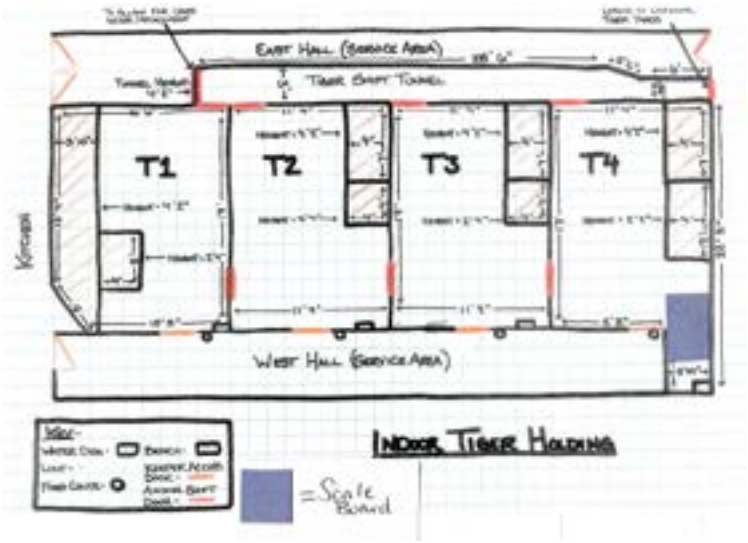

Figure 5

Training for duration for standing on the scale was started, and Zoya was doing fabulous. Zoya then started showing signs of coming into estrous, which previously had halted her training due to a major decrease in appetite. However, at this time it aided trainers. In one session, Zoya came onto the board and turned around like normal, but when she walked back on the board she just laid down. This was a sign to keepers she was truly comfortable with the board; she had never attempted to lay on it before. Because of estrous, Zoya didn't even seem concerned with getting reinforced, she just liked laying on the board. Trainers used this to their advantage and captured her laying down as new criteria for her scale behavior. Trainers thought that if Zoya laid down on the board, the chance of the board moving around was far less which also brought down the chances of Zoya's confidence dropping again. Duration was built onto her "lay down" behavior, she now holds for at least 6 seconds. This is plenty of time for trainers to record a weight on her!

It took trainers about a year and a half to complete this behavior with Zoya. In the end she was successful and trainers can now get regular weights on Zoya. The training of this behavior was just one individual situation. It reminds all trainers that the "Study of One" is a true statement and every individual being trained needs its own special attention. Analyzing Zoya's behavior and the antecedents at each stage was key to successfully training this behavior. Training is fluid and being able to change the training plan at any time is a necessity. Trainers moving at the animal's pace is important and will help the training process progress at a faster rate and prevent getting stuck at an approximation. Thoughtful antecedent arrangement can also be one of the biggest assets to a trainer. Once the antecedents are correct, it seems to be that everything falls into place. This was a learning experience for all of the trainers involved. The skills that were gained and refined will continue to be applied to all future training scenarios. The future holds many different behaviors for Zoya. One big goal for trainers is to generalize Zoya to get on the scale in any den.

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Check Your Baggage at the Door: A Bear's Journey to Contentment

Jennifer Galbraith and Jaime Vaccaro
Tampa's Lowry Park Zoo

Every time an animal arrives in a new facility, it brings its history, good or bad with it. As animal care professionals, we don't always have the entire story of our animals' past experiences and how it shapes their behavior. This provides a challenge for us to optimize the welfare of the animal, encourage its strengths, and assist in overcoming their limitations. This poster focuses on the trials of conquering stereotypical behavior of a wild born male black bear, removed as a nuisance animal, and brought into a zoological environment. Through a commitment to training, diet manipulation, enrichment, exhibit modifications, and introductions to 0.2 wild orphaned black bear cubs, we were successfully able to decrease our male's undesirable behaviors. His overall welfare has dramatically improved and continues to strengthen.

The transition from the wild to a captive environment is full of challenges. As was the case for a 200 pound, 1.5 year old male black bear in Missouri, removed from the wild due to nuisance behavior in the summer of 2003. This bear, Sam, was given a home at Tampa's Lowry Park Zoo in Florida, where it was hoped he could lead a safe and content life exploring the naturalized exhibit and interacting with an older female black bear already in residence. Aside from the obvious stress of having been moved from the wild into a captive environment, other factors played into Sam not adjusting well to his new home. The climate was significantly different from where he came from. His initial experience out on the exhibit was negative as he almost immediately hit hot wire on the perimeter fence. Introductions with the older female bear, who had shared the exhibit with a male before, were also negative. This resulted in Sam exhibiting stereotypic behaviors, being difficult to shift in and out, and an overall anxiety. The keeper staff committed themselves to helping Sam overcome these issues and find contentment. A training program was introduced to provide Sam with some consistency and stimulation, coupled with enrichment multiple times a day. Seasonal tendencies were researched, which led to diet manipulations, and the exhibit was modified to reduce triggers that induced Sam's anxiety. Finally, with the passing of the older female bear, two orphaned female bears were moved in. These efforts combined have alleviated much of Sam's stress and he appears at ease with his environment.

A wild male black bear's diet is regulated by the seasons. In spring, food is plentiful and bears will put on weight to help carry them through the summer. Summer is breeding season, and male black bears will spend more time searching for a mate than eating. They can range from 50 to 120 square miles. During the fall, black bears will again put on weight to see them through the winter when food is scarce. (FWC, 2005) In captivity, the feast and famine fluctuations do not happen, as there is ample food all the time. It became necessary to change the amount of food given based on the time of year. Larger amounts were offered in spring and fall, with the diet being cut in summer, and significantly reduced in winter. Satisfying his hunger reduced the amount of pacing he would do in his night house. Allowing him to become leaner in the summer made him more comfortable in the heat and facilitated him being more active on exhibit. Changing the type of foods he was offered also seemed to help. The staff offered meat protein in the spring and fall, added fruits when they would be seasonally available, and removed them when they were not. Another change was the amount given at any one time. Typically the bears were fed twice a day, A.M and P.M. In the winter Sam did not usually show interest in eating until late in the morning, at these times he was given his whole diet for the day at one time. In the warmer months Sam would go back to twice a day feedings with part of his diet reserved for forage in the exhibit. By manipulating his

diet, the staff was able to mimic the way Sam would be eating in the wild.

Enrichment is a vital part of caring for any animal in captivity. For Sam it was equally important, but provided its own set of challenges. When Sam would be pacing it was compelling to offer enrichment or food to distract him, however that potentially reinforced the pacing. The staff created a plan where Sam was only given rewards when he was not pacing, although it was initially hard to capture that. New complex enrichments were researched to find ways to keep Sam occupied for longer periods of time. USDA was experimenting with a hog feeder, trying to find a way to administer birth control to wild hogs but keep it away from other wild life. After Sam proved it was not bear proof they allowed the zoo to keep it. Adapting enrichment seasonally was also successful in keeping Sam stimulated. Broadcasting his diet on the exhibit allowed him to forage for his food as he would during spring. Fruit floating in his water feature encouraged his swimming, and scents from female bears played to his need to search for a mate.

As fall approached, hay and other vegetation was staged on and off exhibit in response to his desire to den up. Sam would spend time gathering these materials and moving them to his chosen den site. Even though in Florida it does not get cold until December, Sam routinely bedded down for the winter by October. At this point it became almost impossible to have him on exhibit, and trying to do so only created more stress for him. The zoo's management allowed for an educational sign to be posted explaining to the public why they might not see a bear. By allowing Sam the time he needed to fulfill his seasonal needs, the time he spent on exhibit became more enjoyable for everyone.

Operant conditioning is a beneficial addition to standard husbandry. By encouraging natural and desirable behaviors, training can provide not only enrichment to an animal but also create an ease of management to the staff working with them. Through a commitment to training, the staff was able to assist Sam in daily tasks such as shifting to and from his outdoor habitat, as well as shifting from den to den inside, therefore creating a less stressful routine for him. Training not only engaged his body, both mentally and physically, but offered him a sense of security through routine and predictability.

Modifying an exhibit is essential when optimizing an animal's welfare. In a captive environment, it is often difficult to provide animals with the abundance of spacing and naturally occurring options that their wild counterparts would encounter. For Sam, adjusting to life in captivity was definitely a journey. One of his first times out on exhibit resulted in Sam coming into contact with perimeter hotwire, causing him to be even more fearful of the habitat. By adjusting the hotwire level to meet both his needs and our containment standards, the staff was able to help prevent any repeat occurrences. Multi-tiered platforms were built, consisting of four levels, giving Sam the opportunity to not only climb but explore. At times wood and logs were used to create false walls under the platforms, giving him the option to den outdoors. The exhibit had never been challenged by a young agile bear so initially it was considered too risky to leave him access to the yard overnight, as we did with our elderly bear. After a few years with no signs of Sam trying to test the enclosure, it was decided to allow him access overnight. This allowed him to engage in a variety of natural behaviors. During the winter months he would bring in additional bedding substrate for his den and track a multitude of scents, and in the spring he could attempt to satisfy his desire to travel, both for food and companionship. He appeared to be more at ease in the mornings when given the choice to explore the outdoors overnight.

In the winter of 2012, the zoo took in two female orphaned black bear cubs. The arrival of the cubs sparked interest and reignited playfulness in Sam. Prior to physical introductions, just the presence of the females in the habitat allowed Sam to exhibit courtship behaviors as he would in the wild, by sniffing the areas where the females sat and following their scent trail. Not only did the introductions provide Sam with companionship but offered him a continual source of mental stimulation.

Every time an animal arrives in a new facility, it brings its history, good or bad with it. As animal care professionals, we don't always have the entire story of our animals' past experiences and how it shapes their behavior. This provides a challenge for us to optimize the welfare of the animal, encourage its strengths, and assist in overcoming their limitations. Through a commitment to training, diet manipulation, enrichment, exhibit modifications, and introductions to 2.0 wild orphaned black bear cubs, Sam's undesirable behaviors were successfully decreased. His overall welfare has dramatically improved and continues to strengthen.

Acknowledgements
We wish to thank the following people whose contributions made this possible. Our supervisor, Virginia Edmonds for always challenging us to provide the animals in our care with the best possible life. The Florida Mammals Department, both past and present, for their commitment and dedication to bettering Sam's welfare. To Tampa's Lowry Park Zoo for providing Sam a home and patience while Sam adjusted to his new environment, and Dave Parkinson for providing photos.

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Voluntary Injection Training Chinese/ Reeves' Muntjac (*Muntiacus reevesi*)

Jennifer Hoefs

Palm Beach Zoo and Conservation Society

The Palm Beach Zoo and Conservation Society currently houses 1.0 Chinese/Reeves' Muntjac (Muntiacus reevesi) named "Kakan". Born in 2011, he is currently living by himself due to others in the herd passing away. During 2015, he started experiencing health issues such as swelling in his rear right hock. Medication was prescribed for him to take orally, but after numerous attempts he was not reliably taking his medications. Due to this his treatment was further prolonged. The swelling eventually healed. After this, keeper staff decided to improve the management of how he would be medically treated. This paper will describe the thought process behind training this behavior, the behavioral challenges faced, and the success accomplished from using operant conditioning.

Introduction

The Palm Beach Zoo and Conservation Society currently houses 1.0 Chinese/Reeves' Muntjac *(Muntiacus reevesi*) named "Kakan". During 2015 he started experiencing health issues such as swelling in his rear right hock. Medication was prescribed for him to take orally, but after numerous attempts he was not reliably taking his medications. The hock eventually healed, but keepers wanted a new plan of action in case this happens again. Keepers discussed the possibility of voluntary injection training him in order for him to take medications. Through many planning attempts, keepers were finally able agree on one where operant conditioning would be used.

Methods

Before the training could take place, the keeper needed to seek outside help. After discussing the pros and cons with a mentor, the keeper was able to find a way that would work. Keeper compared numerous training plans in order to make one that would work for Kakan. Other behaviors had to be incorporated into this plan for this to succeed. The behaviors that needed to be learned prior to voluntary injection were target, tactile and station.

Operant Conditioning Program

The first behavior taught to Kakan was "target". This behavior was learned quickly, so the keeper was able to move on to the next behavior needed. This behavior was "station". Kakan took a little longer to understand, but he did eventually conquer it. Keeper added a "color station" to the behavior. When there was more animals in the herd, this was beneficial in allowing the keeper to work with another, while Kakan was at his "station". Kakan learned that his target and station color is blue. The theory was tested to confirm whether he could tell the difference between colors, or if he was doing this out of habit. After weeks of only working with a blue target stick, and station disk; keeper added other colors to see what his reaction would be. Keeper added red, green, and yellow station disks during the training session. Every time the keeper would ask him for "station" he would go to his color. Keeper would put his "station" in different areas of the exhibit with the other colors, but he would go to his every time. Kakan was displaying that he is able to tell the difference between the disks.

Once these behaviors were being displayed effortlessly every time, the keeper began approximating voluntary injection training. Numerous steps had to be taken in order for this to be accomplished. When the keeper

asked for him to come to his station, she would work on tactile. Keeper wanted him to be comfortable with being touched all over his body, regardless of the area. Luckily for the keeper, Kakan is not flighty like most hoof stock, and he actually enjoyed the tactile. This worked well on getting him comfortable with an alcohol scrub. After training him to be touched with the alcohol scrub, the keeper progressed to the actual injection desensitization. The first step was using the keeper's finger to approximate the needle. Keeper applied pressure to an area on his rump for a total of 5 seconds and repeated three times. This was done for about a week before the keeper switched to using a ball point pen instead of a finger. He did well with the pen; he noticed a slight change but responded well. This continued for a couple weeks, and then the keeper began using a blunted needle. He continued to do well with the training, and keeper made the decision to use a 0.25mm needle. The first time a needle was used the keeper left the cap on and proceeded with the behavior as usual. Next, the keeper took cap off and lightly touched his rump with the needle. On the third time the keeper broke the skin; he jumped away, but he did come back to his station. This was happening repeatedly during every session where an actual needle was used. Keeper consulted with training mentor, and it was suggested to use a second reinforcer. The second reinforcer would be used during the initial injection behavior. This is where the tactile would come in to help train this behavior. Keeper would scratch Kakan under jaw prior to the actual injection. Once Kakan was fully relaxed, the keeper would "poke" him on him rump with the needle. Keeper worked on this for a couple weeks, and Kakan's training progressed even more by adding the tactiles to the session. He began to accept that being "poked" with 0.25 gauge needle did not faze him. The final stage would incorporate the saline injection during a regular training session. Once injected with the saline solution, Kakan wiggled his rump but did not move from his station. He received 1ml of saline with no issues whatsoever. This behavior took about 5 months to fully train.

Results and Discussion

Kakan learning this behavior has helped him out tremendously. It will allow keepers to medicate him and not have to worry about oral medications. Only one keeper has done this behavior with him, but the keeper will be slowly passing it off to others in time. He is doing well with his overall health; the issue of his rear right hock swelling has not been an issue for some time. The area has not gone down to its original size and it may never do so. His hock being like this is not affecting his gait or comfort and he continues to thrive. Keeper is working on other behaviors with him such as getting him to stand on a scale, voluntarily going into a crate, and possibly voluntary blood draw. During the 5 months it took for him to learn this behavior, Kakan has been an absolute pleasure to work with. He faced each challenge with barely any issues, and has been a great first training project. All training plans that the keeper has developed will be passed on to the other Reeves' Muntjac in the institution, in hopes of having the same success with them as with Kakan.

Acknowledgements

This truly was a great opportunity to improve my skills as a trainer. Kakan challenged my way of thinking numerous times. He taught me that there is more than one way to conquer a mountain. Thank you to the Palm Beach Zoo and Conservation Society, for allowing me to conduct these sessions. I want to thank my mentor Sarah Colman for the encouragement, and always being there when I would get to a road block. Sally Duffield for taking video of our sessions and for always making sure that I had what I needed during the session.

Training a Spot-necked Otter for Voluntary Blood Pressure

Jackie Jella and Leslie Steele

San Diego Zoo

In December of 2014 Mzee, a male African Spot-Necked otter, presented with neurological symptoms and was rushed to the hospital. The exam revealed an enlarged heart and he was prescribed medication. The veterinarian was concerned with monitoring Mzee's condition with regular and accurate blood pressure readings. This presented a challenge and an opportunity to offer an alternative to the current practice of blood pressure readings taken under anesthesia. The Spot-necked otters are managed by protective contact and the blood pressure cuff needed to be placed around the base of his tail for the most accurate reading. In order to accomplish a hands-on procedure while maintaining staff safety, keepers needed to creatively pierce the mental and physical barrier presented by protective contact. Keepers installed a half pipe of pvc to the inside of the mesh. Mzee was then trained to voluntarily enter the pipe and hold while his tail was pulled through an opening in the mesh. This guaranteed proximity of Mzee's tail and maintained protective contact. He was then desensitized to increased pressure at the base of his tail as well as the sounds of the cuff and pump. When he was able to hold the behavior for over one minute a Veterinary Technician was able to get a blood pressure reading. Mzee now has a standing Wednesday morning appointment for a blood pressure read that he voluntarily and willingly participates in and a recent exam showed the accuracy of our readings. In addition to regular blood pressure readings, we will be working on heart ultrasounds without anesthesia as well. These behaviors allow Veterinary staff to monitor his condition and adjust medication as necessary without immobilization, thereby increasing his quality of life with minimal changes to his daily routine.

The San Diego Zoo is currently home to five African Spot-necked otters (*Hydrictis maculicollis*). These otters are exhibited in two mixed species enclosures. The holding for both enclosures is located between the exhibits below a pedestrian bridge. They are shifted onto exhibit during the day, and left with access to holding and exhibit overnight. Their daily diet consists of meat, fish, roots and kibble. Mzee is a 20 year old male otter paired with Pori, a 20 year old female. Both wild born animals were received by San Diego Zoo in 1998. All otters are managed by protective contact and involved in a training program that uses operant conditioning with positive reinforcement. The reinforcement used when training is meat and fish taken from their diet. Mzee is a willing participant in training and is very food motivated. Training sets occur in the morning and usually last 10-15 minutes, and take place in the otter holding area.

Mzee was in good health until he presented with neurological symptoms on December 2nd of 2014. Around 5:00 PM, when Mzee was given access to holding, the keeper noticed that he was having trouble walking and was uninterested in food. He appeared to be having trouble with balance and was lethargic. Mzee was crated and taken to the hospital on grounds for an emergency exam. The exam revealed an enlarged heart. The following is a description of Mzee's medical condition by the lead veterinarian on his case:

> "Mzee has a heart condition called hypertrophic cardiomyopathy. This means that the muscular walls of the heart are thickened. Mzee's left ventricle (which is the part of the heart that pumps blood to the rest of the body) is moderate to severely thickened."(Brenner 2016)

After a few days of recovery at the hospital, he was returned to his familiar holding area with two medications for his heart, enalapril and atenolol. Mzee was reintroduced to Pori in holding and spent a few days inside recuperating before being released onto exhibit. His behavior and appetite at this point had returned to normal and he was consistently compliant with the new medications. The veterinarian on Mzee's case was concerned about monitoring his condition. Ideally, Mzee's blood pressure would be taken on a weekly basis. In the past, blood pressure readings were taken while the otters were under anesthesia, however "some of the drugs we use for anesthesia can lower blood pressure so readings obtained under anesthesia are not generally reflective of the animal's normal blood pressure. This is why awake blood pressure readings are so valuable" (Brenner 2016). The challenge presented was to take blood pressure readings voluntarily, while still maintaining protected contact. The veterinarian advised that the base of the otter tail would be the ideal place to wrap the cuff for accurate readings.

When researching this type of procedure, little to no useful data was found that pertained to our unique situation. Thus, the solution we came up with was based on these factors; the type of data we needed from the animal, and the procedure location that would give us the best chance of success as well as a level of safety for both the animal and personnel participating in the reading process. The following set up provided the best fit to all of these parameters. To ensure consistent proximity to the front of the cage, a PVC pipe 30cm in diameter was split in half and then attached to the mesh. The final length of the PVC was 92cm. A small rectangular hole was then cut in the mesh towards the lower right side of the PVC for access to Mzee's tail. The hole was covered with a piece of mesh. This mesh was secured at the bottom with zip-ties and clipped externally at the top to allow the mesh to be opened only during training sessions. The open mesh inadvertently created a small platform to place the cuff for Mzee's tail.

Once the equipment was in place, a training plan was written and approved. The following is the approved training plan:

1. Trainer gives cue and otter goes willingly into chute.
2. Otter goes into PVC pipe on cue and holds at stationary target for 10 seconds.
3. Otter stations in PVC pipe holds at stationary target for 10 seconds with 2nd keeper present.
4. Otter holds station and allows 2nd keeper to touch tail with back scratcher.
5. Otter holds station and allows 2nd keeper to move tail with back scratcher
6. Otter holds station and allows 2nd keeper to move tail out of access window.
7. Otter holds station and allows 2nd keeper to move tail out of access window then hold tail loosely in hand.
8. Otter holds station and allows 2nd keeper to move tail out of access window, then hold tail firmly in hand with increasing pressure.
9. Otter holds station and allows 2nd keeper to move tail out of access window then wrap with mock pressure cuff.
10. Otter holds station and allows 2nd keeper to move tail out of access window then wrap with mock cuff with increasing pressure.
11. Otter holds station and allows 2nd keeper to move tail out of access window then wrap with mock cuff with increasing pressure for time specified by vet for accurate reading.
12. Otter holds station and allows Vet Tech to move tail out of access window then wrap with mock cuff with increasing pressure for time specified by vet for accurate reading.

Along the way, there were challenges in training, and modifications made to equipment. Originally the PVC was cut too short and an additional piece was added to make the total length 92cm. In addition, a snake-hook was used initially to pull Mzee's tail out. The snake hook proved to be unnecessary and problematic. His tail could be quickly and safely removed without the hook. Because of the snugness of the PVC, Mzee's maneuverability was hampered, making it safer for staff. Mzee proved to be more tolerant of touch to the base of the tail versus the tip of his tail. Touching the tip of his tail made him more likely to withdraw

his tail or leave the chute. It proved to be simpler for the second trainer to draw the base of the tail out by hand. It was also discovered during the training process that continuously reinforcing him with small meat balls held to the mesh, so he had to work to get a little at a time, seemed to work best for keeping him in place. At the end of a session a larger meat ball was given, signaling that he could exit the tube. Thus, with repeated trials and training sessions keepers came up with a method that consisted of two people working with Mzee, one at the tail, putting on the cuff and the other at his head, reinforcing him with meat balls. The veterinary technician was then able to concentrate on the readings. The end result was weekly blood pressure readings taken voluntarily at otter holding. The training session took 10-15 minutes and involved two keepers and a veterinary technician.

To further monitor his condition, veterinarians also expressed interest in listening to Mzee's heart through a stethoscope, and viewing his heart via ultrasound. Allowing the veterinarian to listen to Mzee's heart with a stethoscope will determine if Mzee has a heart murmur. If he does not have a heart murmur, the veterinarian will be able to start him on medication to lower his blood pressure (Brenner 2016). Training

him to hold for an ultrasound of his heart will give information about his heart and how the disease is progressing. This procedure allows for the veterinary staff to gather information without the risk of anesthesia

and provides more accurate information as anesthesia effects physiology. Both ultrasound and stethoscope training require alternate positioning to access the heart sternally. These are training goals that we are currently working towards.

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Preservation of Tomorrow:
Expanding Animal Welfare beyond the Zoo

Anastasia Lagarde

Houston Zoo, Inc.

The welfare of animals is no longer limited to caring for the animals that live within our facilities. Zoos are continuing to break barriers by creating conservation initiatives and actions to help wild populations. Anastasia Lagarde, of the Houston Zoo, splits her time between the carnivore and sea lion departments. Both areas have built conservation programs that are changing the lives of wild animals and encouraging zoo guests to learn more about what they can do to change their behavior to help save these animals. This poster will highlight these conservation efforts. The sea lion department at the Houston Zoo has partnered with NOAA to help educate the public on the presence of monofilament in our water ways, and the importance of properly disposing and recycling marine debris items. Several departments within the zoo have collaborated to make this conservation effort a growing success. While the sea lion department is making progress here in the Gulf of Mexico, the carnivore team is working to protect global and local species. Special zoo events are dedicated to bring awareness to specific conservation issues such as dwindling populations, poaching, and maintaining safe wildlife practices. By partnering with outside groups, such as the Niassa Carnivore Project located in Africa, and bringing these organizations into the zoo community, the zoo promotes awareness which sparks action among the guests. The Houston Zoo is continuing to break down barriers and expand the zookeeper's responsibility for wildlife welfare.

Zoos are continuing to break the barrier between enhancing animal welfare for the animals under human care and animals across the globe by creating and supporting conservation initiatives and actions. If it weren't for zoological facilities, many people would not be able to experience seeing exotic animals. It is because of facilities like the Houston Zoo (HZI) that guests can make a connection with these species, in hopes that they too will make a difference to help the animal's wild counterparts. The Houston Zoo keepers strive to bring conservation messages to life by starting keeper driven conservation initiatives of their own.

Everyone creates trash, however many people don't know, understand, or care about what happens once that trash leaves their hands. Around 80% of human trash ends up in the world's water ways - creating one of the most profound problems marine animals face every day. The sea lion department has made it their mission to educate the public on the issues surrounding marine debris, and how it affects the animals they may see at the zoo as well as the millions of other species which are found in aquatic habitats.

The sea lion department at the Houston Zoo has partnered with the National Oceanic and Atmospheric Association (NOAA) to help the fight to decrease the presence of marine debris, specifically monofilament (fishing line) that ends up in our oceans. The first step was the installation of specially designed monofilament disposal containers that the zoo helped NOAA design, build, and install along a popular fishing jetty in Surfside, Texas. These bins provide a more easily accessible disposal site for people as they fish along the jetty, increasing the likelihood that the line will be disposed of properly. Additionally, the special design of the bins decreases the chance of line falling or being blown out of the container. NOAA visits the jetty once a week to empty the bins of monofilament and make sure the line is properly recycled. To be a part of this effort was just fuel for the fire, and the sea lion team wanted to do more.

In the summer of 2014, the sea lion team began organizing Jetty Clean-Up Days. The goal was to go out to the Surfside jetty at least once a month to empty the monofilament collection bins, and clean up the surrounding areas. While it started with just the sea lion team, this conservation initiative within the zoo has now spread, and

13 other departments have helped and been trained on collecting the monofilament from the jetty. To date, the Houston Zoo has collected 80 pounds of monofilament, approximately 400 pounds of recyclable materials, and about 500 pounds of trash. The monofilament is carefully sorted to remove any other debris, and given to NOAA to be properly recycled. Finally, working out on the jetty gives an opportunity to talk to and educate the public about marine conservation and what can be done on an everyday basis to help save our marine ecosystems.

These conservation efforts are even making it into daily routines at the zoo, by incorporating them into daily sea lion presentations and guest interactions. A presentation called "Ocean Ambassadors" highlights a game of "Reduce, Re-use, and Recycle" initiated by the keeper, with help from sea lions, who encourage guest involvement. Guests will see the sea lion trainer throwing items in the pool that represent different possible types of marine debris. As the sea lion retrieves the items and brings them to the three possible disposal bins, the guests have to call out which bin the sea lion should put the object into. As guests leave after the show, they encounter a large sign describing exactly what marine debris is, how it affects our local ecosystems in Texas, and what people can do to help make a difference. Enhancing the welfare of the animals within a zoo is the priority of any zookeeper. However, the sea lion team at the Houston Zoo is breaking barriers by taking it one step further, and doing what they can to enhance current and future welfare of animals in the wild through action and education.

After the sea lion show, take a walk to the other side of the Houston Zoo, to the carnivore department. Depending on what day or time of the year it is, you may be able to participate in keeper driven initiatives that are now annual events for the zoo, called Spotlight on Species (SOS). A keeper must first get department approval before submitting an official form to zoo management. The process then consists of meeting with the marketing department so the event can become a part of the zoo's formal calendar. The conservation department helps with the messaging of the event, while the education department helps to provide activities and volunteers to help interact with guest. These events have the full support from the entire zoo to make them successful. The keepers interact with guests by providing presentations, activities, and games. SOS events first began in 2007, but have since grown. In 2016, HZI will hosts 16 separate SOS events from several different animal departments. Although there are many SOS events throughout the year, the carnivore department is known specifically for Lion Fun Days, Dog Days of Summer, and Bear Awareness Day.

Many people that live within the greater Houston area forget that Texas is still home to many species of wildlife that may be affected by human-animal interactions. In order to educate our guests about this very issue, the Houston Zoo presented Bear Awareness Day. Former senior keeper, Susan Shepard, organized this one-day event where the zoo guests learn how to co-exist with bears. Two elaborate skits were developed involving the carnivore keepers showing the right and wrong way to safely camp, as well as what to do in case of an actual bear encounter in the wild. A teddy bear repair clinic was also held on the same day to help increase guest participation. Outside agencies, such as the Texas Black Bear Alliance (TBBA), Texas Parks and Wildlife, the Big Thicket National Preserve, and Texas A&M Forest Service participated in this event and were invited to speak to the guests. Bear Awareness Day has now been a staple for the carnivore department for over a decade.

While it's important to focus on the conservation of animals you can find in your own habitat, species that are located around the world are not out of our grasp. Once a well-established population, one of the world's top predator, the African lion (*Panthera leo*) are now considered "vulnerable" on the IUCN Red List. Over the last twenty one years, the population numbers have dropped approximately forty one percent (IUCNredlist-org, 2016). Conservationists Colleen and Keith Begg have founded projects such as the Niassa Carnivore Project to help local people of Mbamba, Mozambique live in harmony with large carnivore species. Each November, the Niassa Carnivore Project puts together an event geared towards the children of these villages; and they call it Lion Fun Days. During these two days, they teach the children of these villages how to live with these apex predators safely by providing games, crafts, interesting facts, and even doing some theatrical skits.

In November 2011, the Houston Zoo partnered with the Niassa Carnivore Project and with the help of former senior keeper, Angie Pyle, hosted the first Lion Fun Days event in the United States, breaking down another barrier by bringing global conservation action into practice. The games played in Houston were the same ones' children would play half way around the world in Africa - ranging from ecological tug of war, to children dressing up as prey and predator adversaries, to making lion masks. Special signage was created to explain the population decrease in the African lion, and how any money donated would go directly to the Niassa Carnivore

Project. Even though lions are not native to the United States, the message of why this species is still important was heard by thousands of people who participated in this event. November will be the zoo's sixth year hosting Lion Fun Days.

Lions are not the only carnivore in Africa whose population is decreasing. In 1990, the African Painted Dog (*Lycaon pictus*) became listed as endangered on the IUCN list. Now projected to have around 6,600 individuals in the wild, their former range has diminished due to habitat fragmentation, poaching, and disease (IUCNredlistorg, 2016). The Ruaha Carnivore Project, Painted Dog Research Trust, and the Painted Dog Conservation (PDC) of Zimbabwe campaigns for the survival of this species, and the Houston Zoo has joined their campaign. Lisa Marie Avendano, Houston Zoo's Director of Animal Heath and Operations, traveled to Zimbabwe to help set up a clinic for PDC and train their staff on different clinical techniques that would assist them in their field conservation efforts. PDC also tracks the wild population of Painted Dogs in Zimbabwe with the use of tracking collars. Members of PDC came to the Houston Zoo and worked with several departments, including the facilities department, to learn how to best fabricate new tracking collars to assist in the monitoring of wild populations.

Here at the zoo, Samantha Junker, a carnivore senior keeper, worked with Lisa Marie and created a SOS similar to that of Lion Fun Days –Dog Days of Summer. In 2015, the carnivore team was able to reach out to approximately 1,500 guests in a 2 day period - an increase from the 850 attendants in 2014. Children colored masks that were created to resemble the African Painted Dogs housed at the Houston Zoo. Guests could build their own snare wire art using pipe cleaners, and twice a day guests could help the carnivore keepers make and give enrichment to the African painted dogs. Keepers continued to give chats throughout the day to help spread the conservation message about these animals. Dog Days of Summer is now in its' fourth year and has been a spring board for 22 other facilities who have taken on this initiative; 15 of them actually making an SOS similar to the one created in Houston.

Animal welfare does not have to be restricted to caring for the animals within zoos and aquariums. As animal care professionals, it is our job to take responsibility for the animals not only under our direct care, but also for their wild counterparts. The Houston Zoo has broken down this barrier by creating initiatives that combine bringing conservation awareness to guests within the zoo, while also promoting conservation action in the field. If we come together we will be able to save these animals. It just takes one person to start the movement.

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Factors Influencing Successful Training in Bottlenose Dolphins (*Tursiops truncatus*)

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Shaping is a training method in which successive approximations are reinforced until a target behavior is accomplished. Although the techniques for implementing shaping procedures are generally qualitative in nature and vary widely among trainers, using small, achievable successive approximations is widely considered to be effective in animal training. Denser schedules of reinforcement are recommended to increase acquisition rate, and are more effective in achieving shaping criteria than leaner schedules. The current study examines the effects of two types of failure (i.e., attempts and no-attempts), step size, and reinforcement rate during training sessions involving six bottlenose dolphins (*Tursiops truncatus*) at the U.S. Navy Marine Mammal Program in San Diego, CA. The effects of these variables on learning a trained beaching behavior were systematically investigated over a 3 month period. Failure types were categorized as (1) trials in which the behavior was attempted or (2) trials in which the behavior was not attempted. Dolphins were able to learn from both attempted and not attempted trials to be successful on the following trial. There was no correlation between the subjects' mean failure rate and the mean reinforcement rate, suggesting that higher rates of reinforcement during training do not decrease failure rates or increase the acquisition rate. Larger mean step sizes were weakly correlated with higher failure rates, indicating that smaller step sizes may be more effective during acquisition. These results have important implications for training program success, underlying the importance of individualized training plans in order to increase training success.

Introduction

Environmental enrichment is broadly defined as "an improvement in the biological functioning of captive animals resulting from modifications to their environment" (Newberry, 1995, pp. 229). Scientific evaluations have demonstrated that environmental enrichment positively affects the welfare of animals living in captivity. However, continued monitoring is necessary as many species rapidly habituate to environmental enrichment devices (EED's; Clark, 2013; Kuczaj, Lacinak, Fad, Trone, Solangi, & Ramos, 2002).

Common approaches to pinniped enrichment, including the introduction of EED's, have been shown to reduce stereotypies as well as increase species-typical behaviors (Clark, 2013). In a recent study, Samuelson (2015) demonstrated that the use of scent-based enrichment yielded both a reduction in stereotypies and an increase in habitat utilization and exploratory behaviors in a captive population of four female California sea lions. This particular study also evaluated the animals' reactions to natural scents (scents present in the animals' natural environment) and non-natural scents (scents not present in the animal's natural environment). Statistical analysis revealed that there was not a statistically significant difference between the two scent types. That is, non-natural scents were just as enriching as natural scents (Samuelson et al., In Review).

Although not statistically significant, the results suggested a practical reduction in stereotypic behaviors, as well as an increase in habitat utilization when specific scents were present – at the individual level. While animals did not respond to scents based on a biological predisposition for natural scents, they may be attracted to specific scents based on their own life history. For example, a hand-reared individual who had stranded very early in life preferred scents such as cinnamon. Alternately, individuals reared with minimal human contact

preferred natural scents such as sardine oil (Samuelson, 2015). These findings suggest not only the importance of preference assessments in ensuring the efficacy of environmental enrichment protocols, but also the importance of considering an animal's individual life history in shaping their preferences.

Applications & Future Directions

Ease of Use

Although essential to the welfare of marine mammals in human care, enrichment is often constrained by the financial capacity of the facility, as well as by the caretakers' busy schedules (Newberry, 1995). However, olfactory enrichment is both inexpensive and easy to prepare. Items such as dirt, scents from other species from within the facility, scented oils, simple spices, and perfumes can all be leveraged for this purpose. These items are not only inexpensive, but can also be donated by visitors to the facility.

Combatting Habituation

Because animals often habituate quickly to EED's, it is imperative to present them in new and innovative ways in order to maintain interest (Hoy, Murray, & Tribe, 2010; Kuczaj et al., 2002; Law & Reid, 2009; Samuelson, 2015; Shepherdson, 1998). Olfactory stimuli can be incorporated with current EED's in order to maintain or recapture an animal's interest. For example, a simple Kong ball could be enhanced through placing a novel scent inside of the ball before introducing it back into the enclosure.

While scent has been explored in a wide array of species (e.g., Andrews & Ha, 2014; Kitchener & Asa, 2010; Leonard, 2008; Nelson, 2009; Price, 2010; Rafacz & Santymire, 2014; Schneider, Nogge, & Kolter, 2014; Wells, 2004), the versatility of this enrichment approach has received little attention. For example, a caretaker can mix and match scents in order to create nearly infinite novelty.

Olfactory Maps for Impaired Animals?

Ocular health is of a high concern for sea lion caretakers, as it is common for this species to develop visual impairments as they age (Colitz et al., 2010). Caring for visually impaired animals is, of course, very challenging and requires a high degree of training and foresight to ensure the animals' welfare. I propose the consideration of using scent-based associations to assist blind animals in creating an olfactory map of their environment (e.g., associating cinnamon with the gate area and cumin with a fresh water tub), which would allow an animal to navigate through their environment safely without the assistance of a human caregiver.

Evaluation

Still it remains critical that as these potential avenues for enrichment are explored, animal care professionals and researchers continue to monitor the efficacy of these approaches to ensure that the desired effects are met (e.g., Kuczaj et al., 2002). Additionally, it is imperative that veterinarians approve all scent items prior to their inclusion in an environmental enrichment protocol to ensure that there are no adverse effects resulting from the introduction of scent-based stimuli.

Conclusion

Pinnipeds are caniform carnivores and closely related to ursids, canids, and mustelids (Ledje & Arneson, 1996). They have retained scent receptors and complex nasal turbinates (Kishida, Kubota, Shirayama, & Fukami, 2007) and often utilize scent to recognize conspecifics in the wild (Pitcher, Harcourt, Schaal, & Charrier, 2011). Still, olfactory enrichment has been relatively overlooked as a functional modality for improving the welfare for pinnipeds in human care, despite its effectiveness in improving welfare outcomes in other caniform species (e.g., Andrews & Ha, 2014; Kitchener & Asa, 2010; Leonard, 2008; Nelson, 2009; Price, 2010; Rafacz & Santymire, 2014; Schneider, Nogge, & Kolter, 2014; Wells, 2004). These findings just scratch the surface in describing the nearly infinite possibilities for olfactory enrichment, and it is the author's hope that innovative caretakers will expand upon these findings to improve the lives of the sea lions in their care.

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Focusing on Individual Training and Advanced General Husbandry Practices with Spider Monkeys (*Ateles geoffroyi*) Utilizing Station Training

Nikki Maginness

Brevard Zoo

Brevard Zoo has housed social groups of up to six spider monkeys (Ateles geoffroyi). Due to the large number of individuals and limitations in exhibit design, there were several obstacles regarding individual training and certain husbandry practices. For example, the exhibit did not have a built-in scale to voluntarily take monthly weights, which is important data to collect for weight management. Also, as there are not enough areas to individually separate the animals, it was hard to focus on one-on-one training sessions with each monkey. This limited the progress of their training. Training is a helpful tool for general husbandry, but can also be incredibly enriching for the animal. Thus to alleviate some of these issues, we implemented station training. Station training involves having a station, or assigned spot/target, for the animal to stay at while being trained. This allows the keeper to focus on that particular animal and minimize interference from other individuals without separating the animal being trained. This was achieved by assigning each monkey a wooden shape by which they had to stay in order to receive their diet. Moving the stations to different areas allowed us to confirm they associated their target with their station rather than the location in the enclosure. Though there were some setbacks in the training process (mainly due to social changes within the group), stationing helped eliminate most of the problems. This method of station training can be used, not only for primates, but any group of social animals.

Introduction:

Spider monkeys, like most primates, are very social animals. Their social structure, dominance, sexual behavior, and other interactions have a dramatic effect on training (Ramirez, 1999). Due to the large number of animals and the social situations that occur every day, it can be difficult to individually train each monkey without removing them from the social group. Additionally, other group members can, and do, interfere with training of other individuals.

Limitations in exhibit design can also create obstacles for keepers to move forward with training and husbandry practices. The spider monkey exhibit at Brevard Zoo includes a large yard that is connected to the night house by a tunnel. In the tunnel, there are three doors: a guillotine door that separates the tunnel and yard, a guillotine door that separates the tunnel in the center, and a sliding door that separates the tunnel and night house. Also found in the tunnel is one squeeze cage that is directly beside the middle guillotine door. (See Figure 1. *Tunnel with the squeeze cage area behind the exhibit.*) The night house is a concrete building with two stalls that can be closed off by a guillotine door in the middle. The design of the exhibit as a whole created two problems. The first was that there were no areas to

Figure1

successfully and consistently collect weights. The other was that though the individuals could physically be separated, it could create a stressful environment.

Stationing is a type of training that has been used to successfully work with social groups of animals. This involves using a station in order to focus on each individual, while limiting the interference of others. A station is an assigned position designated by the trainer where the individual being trained must stay (Ramirez, 1999). A benefit of this type of training is that it allows keepers to work with the animals without having to physically separate them (often times creating a stressful environment). This paper will focus on the stationing process and discuss the further training and husbandry practices that were possible due to successful station training.

Table 1. Demographic information on the Spider monkeys housed at Brevard Zoo during the station training process.

Name	Sex	Age (in years)
Shelley	F	25
Shooter	M	19
Tika	F	13
Poppy	F	4
Sandy A. Go	M	3
Prim	M	1

Method:

The first step of station training was deciding what type of station would be used for each individual. The stations that we used with the Spider monkeys were wooden cutouts of varying shapes and colors. (See Figure 2. *The stations that were assigned to each monkey.*) These shapes could either be put on the ground in front of sections of the tunnel or hung from plant hangers on the sides of the exhibit. (See Figure 3. *The stations shown hanging from plant hangers in the exhibit.*)

Figure 2

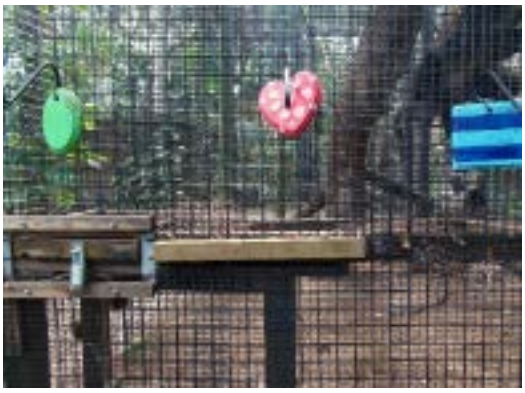

Figure 3

Each individual was assigned a station (or target). In order for them to understand that that particular station belonged to them, their station was placed in front of them during feeding. At first, this took place in the tunnel to remove unnecessary distractions that may have been present in the exhibit. As long as they stayed with their station, they were rewarded with their diet. If they strayed from it or sat in front of another monkey's target, they were not fed. We allowed them to touch or play with the stations so they became habituated to the objects as a positive item. As they became comfortable with their stations, we began moving them to different areas of the tunnel. Some of the individuals caught on more quickly than others but they all eventually learned to station at their appropriate target.

We then transferred the stations into the main exhibit yard. We attached hangers to four locations in the yard to hang the targets on. There were four plant hangers in the exhibit: three along the side where a platform was installed, and one on the back wall in the same area. All the stations could be hung from the hangers or some could be placed by the tunnel. Despite the larger distances between the station spots, the monkeys all transitioned well to stationing in the yard. Keepers were then able to focus on furthering individual training.

Individual Training Practices:

Since keepers could now work one-on-one with each individual monkey, we began focusing on daily behaviors. Training can be very enriching but can also help the keepers better care for their animals. For example, body cue behaviors such as "open" can allow keepers to check the teeth of an animal. Asking an animal to sit on a scale allows keepers to get an accurate weight. Asking an animal for "hand" allows the keeper to check fingers, nails, or paw pads.

Table 2. Current behaviors performed during daily training sessions.

Behavior	Verbal Cue	Visual Cue	Behavior
Target	"Target"	Hold target stick up	Grab and hold stick
Foot	"Foot"	Point to base of tunnel near foot	Put foot up against fencing
Open	"Open"	Hold thumb and forefinger open	Open mouth
Up	"Up"	Hold hand flat and move up	Stand up
Sit	"Sit"	Hold hand flat and move down	Sit down
Hand	"Hand"	Hold hand out towards monkey	Hold keeper's hand calmly

General Husbandry Practices:

Weighing

Collecting monthly weights from all of our animals is a very important husbandry practice. Changes in weight are often the first, and most obvious, sign of sickness, pregnancy, or other health problems. Successful, consistent weights were hard to get with the spider monkeys for two reasons: lack of a scale area in the exhibit and no reliable way of keeping each individual in one spot for long.

Installing a weighing platform in the exhibit yard helped solve the first problem. The platform included three areas to sit, the center having a frame that could hold a scale or mock scale. (See Figure 4. *Poppy seen next to the weighing platform. The raised frame holds either a mock or real scale.*) The platform was installed along the wall that had three of the plant hangers for stations. Stationing helped solve the second problem. Each individual could be stationed to the scale while the others were stationed to other areas in the exhibit or tunnel. The combination of the platform and stationing allowed keepers to get consistent weights for the first time in years.

Figure 4

Separation Training

Gating and separation are important cooperative behaviors that help us to meet training, medical, maintenance, and social needs (Ramirez, 1999). Separation training is often necessary in larger groups of social animals. It allows an individual to be briefly separated from the group with minimal stress. We needed to implement separation training with the spider monkeys for several reasons. During weighing sessions, certain monkeys were more eager to sit on the scale than others. In fact, it was often difficult to get one of them to leave the scale at all. Separating the scale-happy individual allowed lower ranking individuals access to the scale. Separation also helped in the case of immobilizations. If one individual was due to have a check-up, we needed all the monkeys to be comfortable with closing one in the tunnel area while the others remained in the yard.

Separation training was accomplished by using stations to separate one individual each session into the tunnel. The others would be trained in the yard during this time. Over time, keepers were able to start moving the guillotine door that separates the yard and tunnel. Eventually we were able to fully close the

door for a short period of time with all monkeys calmly training.

Squeeze Cage Desensitization

A very important part of husbandry training involves being able to get an animal ready for an immobilization, while minimizing the stress on the animals. While methods such as netting, grabbing, or restraint often need to be used, these are very stressful ways to catch up an animal. A large benefit to training involves giving animals choices. If an individual can be trained to willingly sit in a squeeze cage, enter a crate, or offer a body part of injection, that individual, as well as the rest of the group, is much less stressed.

Using a station in front of the squeeze cage allowed the monkeys to habituate to the formerly scary, stressful location. (See Figure 5. *Shelley stationing in the squeeze cage.*) Thanks to the stationing, keepers have been able to easily squeeze the monkeys for numerous immobilizations this year. Keepers are now using the squeeze cage area and stations to work on voluntary injections by asking the monkeys for their hands and injecting their arms with mock syringes. The once terrifying section of the tunnel is now a calm training spot.

Figure 5

Discussion:

Station training has been instrumental in the advanced training and husbandry practices that are now being used with the Spider monkeys at the Brevard Zoo. Once we started using the targets for very simple tasks, the monkeys caught on much more quickly than we anticipated and we were able to move on to more complex training.

We did, however, have obstacles along the way. First, some individuals progressed much more quickly than the others. The younger monkeys were able to perform behaviors with minimal training, while the older ones (mainly our breeding female, Shelly) were less responsive. Prim was too young at the time to fully grasp the behavior. Thus, different individuals have progressed to different degrees in their training. (See Table 3. Number of training sessions until stationing was established.) Also, it was challenging to coordinate keeper schedules so that all three were available for training sessions. But, we found that even committing to just ten minutes at a time, 3-5 times per week was very beneficial.

Table 3. Number of training sessions until stationing was established.

Some social primate groups follow a fission-fusion dynamic. Spider monkeys will often forage with smaller groups and can change these groups when social issues arise. The constriction of captivity severely restricts opportunities for these fission-fusion events (Davis, 2009). Social changes within any group of animals can lead to a regression in training. Though we encountered such changes at times, the simple use of stations allowed the monkeys to progress through their training quickly, getting back to the level they were each at previously.

Overall, station training has been very beneficial and enriching for the monkeys… and the keepers. Besides the obvious benefits to their care, spending so much time training new behaviors strengthened the relationship between animal and keeper.

Acknowledgements:

Thank you to Lauren Hinson, who came up with the stations and helped start us off with the whole process. Thank you to all the keepers that work in the La Selva section of Brevard Zoo. Your hard work and consistency during all of the training sessions showed in the results. Also thank you to the Supervisors, Zoological Managers, Curators, and Director for their support during the training and paper writing process. And a very special thank you to Dr. Darby Proctor for your guidance and advice- this paper would not be possible without your help!

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Be A Zookeeper Zone:
Turning Animal Care into Science

Emily Martin

Denver Zoo

At Denver Zoo, there is a new innovative area in which the Animal Ambassador team is mastering the art of teaching guests the science behind zookeeping. There are several star players on this team: keepers, volunteers, play facilitators and, a family favorite, llamas Jorge and Fernando. In 2015, an acre at Denver Zoo was dedicated to the Be A Zookeeper Zone (BAZZ). The primary focus of this area is to teach guests the science skills a zookeeper must have in order to provide the best animal care.

Sharing the llamas' story is a great way of connecting Denver Zoo's dedication to animal care with the public. The area engages guests to learn about feeding, enrichment, husbandry, and training the llamas using positive reinforcement. (My poster will include training challenges, plus how the llamas fit the goals of BAZZ).

Throughout the days, there are several other activities happening at Be A Zookeeper Zone. Guests may meet an animal ambassador who is teaching kids about animal nutrition and including kids to help create diets for animals like turtles or guinea pigs. This interactive learning station is a truly unique addition to Denver Zoo and a new way of providing an inside look at zookeepers' lives.

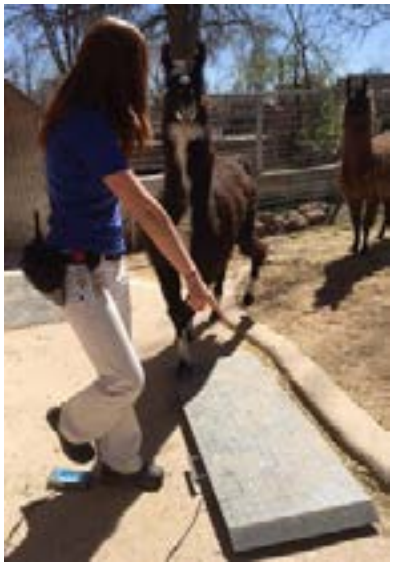
Spring of 2015, Denver Zoo turned an old exhibit into a new innovated education center called Be a Zookeeper Zone (BAZZ). The goal is for this interactive area to provide children ages 2-10 and their adults a chance to learn about the science of zoo keeping through hands on learning using scientific methods. This area also provides a more intimate setting for zookeepers to share how we provide excellent care to Denver Zoo's animal collection. There are many different daily activities that take place in BAZZ such as understanding animals' habitat, animal nutrition, animal observations, enrichment and llama training.

Be a Zookeeper Zone is staffed by Denver Zoo's animal ambassador keepers and education guest facilitators. One area that the guest facilitators run is a Science in Action station, which rotates activities throughout the day. A fan favorite is the Creative Care Corner, which focuses on encouraging kids to think like a zookeeper and create animal habitats. Guinea pigs and box turtles are the stars of Creative Care Corner. Facilitators get the kids to think outside the box with what an animal might like to have in their habitat and talk about what animal must have to be able to survive. The kids have fun using different substrates, colorful enrichment, and even test animals' food preferences. Guest facilitators are engaging the kids teaching them scientific thinking, and asking them questions throughout the whole process. As animal keepers, we have received great feedback and learned new substrates and enrichment that certain animal individuals really enjoy. Other activities that occur in this area are diet preparations, where a table is set up with different animal grains and pictures

of produce. The kids learn what different animals around the zoo eat and weight out mock grain diets. Rotating between these activities is also an enrichment demonstration. The kids are taught what enrichment is and why it is so important, and they assist in making enrichment for either the llamas or for the next visiting animal in outdoor recesses.

What is Outdoor Recess? This is an area where children can relate their love of recess to how zookeepers provide similarly enjoyable opportunities for their animals, in a unique transitional habitat. When designing BAZZ, keepers requested a place where they could exercise and enrich their animal ambassadors safely outside, since those animals are normally behind the scenes. This makes Outdoor Recess truly a win-win for keepers and guest! Along with guests enjoying our animal ambassadors, guest facilitators are teaching kids how to create ethograms. This activity is a fun introduction to the scientific process of field research. Through the observation of animal behavior, scientists can learn about the health and wellbeing of animals and learn about how they interact with their environment. We encourage kids to use observational skills and record their findings on white boards. The Outdoor Recess stars vary from birds of prey, parrots, porcupines, tamanduas, armadillos and reptiles. The animals in recess rotate throughout the day, so kids are encouraged to come back and see how different animals may use the space. During animal switches, the keepers also provide an animal demonstration for guest to meet the recess star up close. The demonstration focuses on the animals' wild habitat and how keepers use science to create similar habitats and meet the needs of animals at Denver Zoo.

Lastly, two animals that you can always find at "Be A Zookeeper Zone" (BAZZ) are the charismatic llamas, Jorge and Fernando! The llamas participate in BAZZ activities daily varying from enrichment demonstrations to "Meet the Llamas or Zookeepers in Action." Kids learn from firsthand experiences zoo keeping by assisting keepers with the duties of enrichment and training, and understanding daily care duties like recording weights and cleaning. Our most popular demonstration is "Meet the Llamas" where keepers bring Jorge and Fernando out on halter and lead allowing guest to meet the boys up close and personal. We incorporate positive reinforcement training in these demonstrations, teaching the llamas to be comfortable with all types of guest. The guest are allowed to feed, touch and sometimes help target train the llamas. The adults enjoy the llamas as much as the kids do, and it's a great tie in for us to share our South American conservation projects.



Why llamas? Why not? Jorge and Fernando came to Denver Zoo from a ranch in Colorado where they were working pack llamas. Now that they are part of the Denver Zoo family, which incorporates positive reinforcement training, life had been a bit different for the boys. They are learning a lot and doing fantastic as animal ambassadors! A few of the big training hurdles we have conquered are halter training, scale training and accepting touching. When the boys first came they would back away from hands. Now, when a hand is presented (via keeper or guest) they lean right into the hand for some scratches, which is a big crowd pleaser. Halter training has also been a big challenge they overcame, which we wanted to be a positive experience. After some hard work, keepers can now present the halter and the llamas stick their face right in, holding the position until it's clipped. With halter training complete, the llamas enjoy their walks out in the zoo and the keepers are currently working on new husbandry behaviors with both Jorge

and Fernando. We are excited for the future.

To conclude, I would have to say that the last year was full of learning opportunities for all, including animal ambassador keepers and animals, guest facilitators, and of course lots of children. This interactive learning station is a truly unique addition to Denver Zoo and a new way of providing an inside look at zookeepers lives. We are elated to see how "Be a Zookeeper" grew over just the first year and beyond excited and ready for a busy summer teaching thousands of kids about the science of animal care!

Positive Reinforcement Driven Behavior Management of Cheetahs and Its Effects on Welfare and Breeding Success

Becky McKeel and Bonnie Baird

Busch Gardens Tampa and Cleveland Metroparks

Cheetahs have been difficult to breed in captivity (Marker & O'Brien, 1989). Studies have suggested that this low reproductive success could be attributed to chronic stress resulting from captive conditions and exposure to humans (Terio et al., 2004; Wells et al., 2004). As a result, breeding cheetahs are often managed using a hands-off approach in order to continue to reach a sustainable ex-situ population. Cheetahs hand-raised and managed as Animal Ambassadors are typically highly trained with a very hands-on approach and have historically been unsuccessful breeders. However, some facilities have recently been able to implement a behavior management approach that allows for managed care without compromising breeding success. Busch Gardens Tampa has gone so far as to partner with White Oak Conservation Center in order to successfully breed two hand raised and highly trained female Animal Ambassador cheetahs that successfully raised their own cubs. This poster will discuss the various ways that cheetahs are managed or trained in AZA institutions in comparison with the positive reinforcement training paradigm at Busch Gardens Tampa and current research that is underway to help determine specific factors that may impact cheetah welfare and reproductive success.

Olfactory Enrichment in California Sea Lions (*Zalophus californianus*)

Mystera M. Samuelson, Lisa K. Lauderdale, Tim Hoffland, Kelly Pulis, Moby Solangi and Heidi Lyn
The University of Southern Mississippi;
The Institute for Marine Mammal Studies

Zoological institutions are constantly seeking new and innovative methods of improving captive animal welfare through the use of diverse and varied enrichment techniques. Still, evaluating the effectiveness of these new approaches is critical in ensuring that the highest quality of animal welfare is administered at all times. In this study, we examined the use of olfactory enrichment in reducing stereotypical behavior in captive California sea lions (Zalophus californianus). Scent enrichment was of two types: 1.) Natural scents, found in their native environment, and 2.) Non-natural scents, not found in their native environment. Animal welfare outcomes were then assessed by tracking the rate at which stereotypical behaviors occurred before and after the enrichment was introduced. Findings indicated that scent enrichment did significantly impact sea lion behavior as demonstrated by a reduction in pattern swimming, an increase in habitat utilization, and a reduction in stereotypical behavior. However, there were no differences in behavior between natural and non-natural scent conditions indicating that novel scents are likely to be enriching regardless of their relevance to the animals' natural environment. Individual differences did arise also, indicating the importance of varying and individualized enrichment plans to maximize welfare outcomes for each animal.

Introduction

Environmental enrichment is broadly defined as "an improvement in the biological functioning of captive animals resulting from modifications to their environment" (Newberry, 1995, pp. 229). Scientific evaluations have demonstrated that environmental enrichment positively affects the welfare of animals living in captivity. However, continued monitoring is necessary as many species rapidly habituate to environmental enrichment devices (EED's; Clark, 2013; Kuczaj, Lacinak, Fad, Trone, Solangi, & Ramos, 2002).

Common approaches to pinniped enrichment, including the introduction of EED's, have been shown to reduce stereotypies as well as increase species-typical behaviors (Clark, 2013). In a recent study, Samuelson (2015) demonstrated that the use of scent-based enrichment yielded both a reduction in stereotypies and an increase in habitat utilization and exploratory behaviors in a captive population of four female California sea lions. This particular study also evaluated the animals' reactions to natural scents (scents present in the animals' natural environment) and non-natural scents (scents not present in the animal's natural environment). Statistical analysis revealed that there was not a statistically significant difference between the two scent types. That is, non-natural scents were just as enriching as natural scents (Samuelson et al., In Review).

Although not statistically significant, the results suggested a practical reduction in stereotypic behaviors, as well as an increase in habitat utilization when specific scents were present – at the individual level. While animals did not respond to scents based on a biological predisposition for natural scents, they may be attracted to specific scents based on their own life history. For example, a hand-reared individual who had stranded very early in life preferred scents such as cinnamon. Alternately, individuals reared with minimal human contact preferred natural scents such as sardine oil (Samuelson, 2015). These findings suggest not only the importance of preference assessments in ensuring the efficacy of environmental enrichment protocols, but also the importance of considering an animal's individual life history in shaping their preferences.

Applications & Future Directions

Ease of Use

Although essential to the welfare of marine mammals in human care, enrichment is often constrained by the financial capacity of the facility, as well as by the caretakers' busy schedules (Newberry, 1995). However, olfactory enrichment is both inexpensive and easy to prepare. Items such as dirt, scents from other species from within the facility, scented oils, simple spices, and perfumes can all be leveraged for this purpose. These items are not only inexpensive, but can also be donated by visitors to the facility.

Combatting Habituation

Because animals often habituate quickly to EED's, it is imperative to present them in new and innovative ways in order to maintain interest (Hoy, Murray, & Tribe, 2010; Kuczaj et al., 2002; Law & Reid, 2009; Samuelson, 2015; Shepherdson, 1998). Olfactory stimuli can be incorporated with current EED's in order to maintain or recapture an animal's interest. For example, a simple Kong ball could be enhanced through placing a novel scent inside of the ball before introducing it back into the enclosure.

While scent has been explored in a wide array of species (e.g., Andrews & Ha, 2014; Kitchener & Asa, 2010; Leonard, 2008; Nelson, 2009; Price, 2010; Rafacz & Santymire, 2014; Schneider, Nogge, & Kolter, 2014; Wells, 2004), the versatility of this enrichment approach has received little attention. For example, a caretaker can mix and match scents in order to create nearly infinite novelty.

Olfactory Maps for Impaired Animals?

Ocular health is of a high concern for sea lion caretakers, as it is common for this species to develop visual impairments as they age (Colitz et al., 2010). Caring for visually impaired animals is, of course, very challenging and requires a high degree of training and foresight to ensure the animals' welfare. I propose the consideration of using scent-based associations to assist blind animals in creating an olfactory map of their environment (e.g., associating cinnamon with the gate area and cumin with a fresh water tub), which would allow an animal to navigate through their environment safely without the assistance of a human caregiver.

Evaluation

Still it remains critical that as these potential avenues for enrichment are explored, animal care professionals and researchers continue to monitor the efficacy of these approaches to ensure that the desired effects are met (e.g., Kuczaj et al., 2002). Additionally, it is imperative that veterinarians approve all scent items prior to their inclusion in an environmental enrichment protocol to ensure that there are no adverse effects resulting from the introduction of scent-based stimuli.

Conclusion

Pinnipeds are caniform carnivores and closely related to ursids, canids, and mustelids (Ledje & Arneson, 1996). They have retained scent receptors and complex nasal turbinates (Kishida, Kubota, Shirayama, & Fukami, 2007) and often utilize scent to recognize conspecifics in the wild (Pitcher, Harcourt, Schaal, & Charrier, 2011). Still, olfactory enrichment has been relatively overlooked as a functional modality for improving the welfare for pinnipeds in human care, despite its effectiveness in improving welfare outcomes in other caniform species (e.g., Andrews & Ha, 2014; Kitchener & Asa, 2010; Leonard, 2008; Nelson, 2009; Price, 2010; Rafacz & Santymire, 2014; Schneider, Nogge, & Kolter, 2014; Wells, 2004). These findings just scratch the surface in describing the nearly infinite possibilities for olfactory enrichment, and it is the author's hope that innovative caretakers will expand upon these findings to improve the lives of the sea lions in their care.

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Methodology and Benefits of Positive-Reinforcement Training with a Small Primate: Self Crating and Latching Capabilities of the Red-Ruffed Lemur (*Varecia rubra*)

Julianne Shabetai
Busch Gardens Tampa

Training a protected contact lemur to shut itself into a crate will benefit the keepers that work with that animal. Zookeepers must learn to be flexible when training the animals under their care as every animal has a unique background and behavior trend. Sava is a Red Ruffed Lemur that has been successful with behavioral conditioning with trainers. For our behavioral priorities, two keepers are present when working Sava without a barrier. An example of this is a crate session, where she would be asked to enter the crate by one keeper and the crate door was shut by another keeper. For this reason, it was decided that Sava would be trained to assist the keepers by closing the door herself after being asked to go in the crate. If she was asked to crate and was capable of closing herself in that crate, this would allow one keeper to work with her, crating her alone. This paper will explain the process of training Sava and the equipment used to make a suitable crate for this behavior. The idea of an animal crating itself can potentially be applied to many different situations with other species, especially when referring to animals with whom keepers cannot work in a free contact scenario.

Introduction

Asking an animal to go into a crate is a simple but necessary behavior. Many animals need to be put into a crate for transport to the hospital for their annual checkups, medical emergencies, or even for relocating to another habitat. If an animal can simply be trained to get into the crate on their own accord, that spares the animal unnecessary stress of having to be caught up and placed in the crate. At times the animal's nature makes the crating behavior a little more complex. Sava is a Red Ruffed Lemur at Busch Gardens Tampa. When working with her without a barrier, two keepers must be present. Sava had initially been trained to be asked to get in the crate by one keeper while the door was closed by a second keeper. It was determined that with some training and crate modifications, she could be trained to get in the crate and close the door herself, while a trainer was on the other side of a barrier.

Modifying the Crate

First, a lemur-sized handle was needed that could be attached to the mesh crate door. A plastic rectangular drawer handle was used and attached to a 5.08 cm by 10.16 cm (2 in. by 4 in.) piece of plywood. This handle would eventually be attached to the inside of the crate using a zip tie. Next, the manual latch on the crate was removed and replaced with a metal quick latch. Finally, a thin metal rod about 60.96 cm (2 ft) long was made with a small hook at the end so that the keeper could open the quick latch on the crate from outside the barrier.

Training Steps

Sava was initially introduced to the handle while it was attached with a zip tie to the mesh barrier between her and the keeper, with no crate involved. In the first approximation, she was trained to grasp the handle with one of her front hands after both a verbal and visual discriminative stimulus (S^D) were used. A whistle served as the bridging stimulus. Once this approximation was complete, the handle was zip tied to the inside of the crate door and placed into her habitat. The crate was positioned horizontally closest to the barrier so that the trainer could reach to reinforce Sava in the crate. The crate door opened towards the barrier, making it easy for the trainer to use the metal rod to open the crate door. At this point the quick latch had not yet been installed, so even if Sava pulled the door closed she would not be securely latching herself inside. The next approximation was asking Sava to get into the crate, and then using the same verbal S^D and visual S^D to ask her to grasp the handle. As she progressed, the behavioral criterion was constantly changed from her moving the crate door a small amount to her purposefully pulling the crate door completely closed. Once Sava could continuously get into the crate and pull the door all the way back to the crate, the crate was then modified to add the quick latch. The final behavioral goal was asking Sava to get in the crate, then using the same S^D as before, ask her to pull the crate door closed with enough force that the crate door was securely closed with the quick latch. The metal rod was used by the keeper to unhook the quick latch from outside the barrier and pull the crate door open, allowing Sava to exit the crate.

Conclusion

The next step to this crate behavior with Sava is to make it a distal behavior. This way the keeper can place the crate anywhere before allowing Sava access to the habitat, instead of just right next to the door. There are a number of animals who require more than one keeper to be present when working with that animal without a barrier, or who require all keepers to always be on the other side of a barrier. This training method and crate modification can be applied to other lemurs, or even different species of animals who are in that situation, creating an innovative way for a single keeper to continue working that animal individually. The handle used with Sava could be used with other primates or animals that are able to grasp and pull. To use this method with an animal who does not have the same hand dexterity as that of a primate, a different modification of the handle would be needed. For example, a muntjac might have an easier time using its mouth to bite and pull a rope that was attached to the crate door instead of the plastic handle.

Cub Kindergarten: Training Three Lion Cubs for Voluntary Injections in Protected Contact

Jess Thompson, Andrea Bryant, Diana Cartier and Amy Schilz

Cheyenne Mountain Zoo

Imagine holding 20 lbs. of wriggling and snarling fur, teeth, and claws. Now imagine carefully sticking a needle into this writhing mass. Now do it again every 2 weeks for a series of vaccinations, and again when the teeth and claws have grown to 90lbs. This is a common scenario when giving vaccinations to young animals, whether they are domestic puppies or kittens, or wild cats in a zoo. Operating under the assumption that if an animal takes food, it can be reinforced, Cheyenne Mountain Zoo lion keepers decided to spare some strife for all involved, and train three 3-month old lion cubs to voluntarily accept injections in a protected contact setting. We believe this can serve as an example that even the youngest learners are capable of participating in their own care.

On 25 June 2015, "Lomela," an 8 year old female African lion (*Panthera leo*) at Cheyenne Mountain Zoo gave birth to her first litter of cubs. Lomela was attentive and the cubs appeared to be nursing, so no initial attempts were made to separate Lomela from the cubs. Lomela was given the choice of two nesting areas, and she would move the cubs from one area to another once that area was clean. Staff continued to monitor the growth and behavior of the cubs and began to notice that one of the cubs did not seem to be nursing as much as the others. On July 4 the decision was made to get the cubs in hand in order for vet staff to examine them, and get sexes and weights. The one female and two male cubs weighed in at around 4 pounds each and all seemed in good condition, so they were returned to Lomela who continued to be an attentive mother.

At a month old, the cubs were starting to move out of the nest box on their own and beginning to sniff the meat held out on tongs for Lomela. In the next 2 weeks they began exploring the back holding stalls on their own and were given access to the indoor exhibit for the first time. They also began eating a small amount of meat from keepers off of tongs at 6 ½ weeks old. At 7 weeks old, keepers began inviting guests back to feed the cubs from tongs. Lomela was initially separated into an adjacent howdy stall, then later stationed across the dayroom with a view of the cubs. At this point, Lomela was able to get up and go over to the cubs at any time. At first she would get up when people other than her regular keepers were present, but eventually she became comfortable enough to stay on the other side of the exhibit. At 8 weeks old, the cubs were weighed voluntarily by being baited on to a scale placed in one of the stalls. The cubs also received their names (Elsa, Boma and Aslan) and began to learn a "down" behavior.

On August 27, when the cubs were 9 ½ weeks old, staff knew that the cubs would need their first round of vaccinations, so Lomela was separated into another stall. Staff used towels to catch up each cub and restrain it for the vets to examine. Though they were only about 20 pounds each, they wiggled quite a

bit, and yowled throughout the procedure. It was difficult for keepers to hold them relatively still for their exam, injections, and blood draw. Lomela was aggressive after the cubs were picked up, snarling at keepers and charging at the public through the exhibit glass. One of the cubs, Aslan, also whined a lot the rest of the day, though all the cubs did come over and take meat from the keepers later that day. The staff knew that the cubs would soon need more rounds of vaccinations. They decided to try to train the cubs to allow voluntary injections instead of catching them up each time, hoping that this would save stress on cats and humans alike, as well as preserving their relationship.

The cubs were already reliably coming over to the keepers for meat, and a large log was placed parallel to the training space, so that the cubs would have to line up sideways touching the mesh to get to the meat. This training happened multiple times a day, and vet staff began coming down to the area during the sessions. Initially the cats were worked up with the vet staff present, though began to calm down throughout the sessions. Other staff and VIP guests also participated in the training sessions to help Lomela and the cubs get used to a variety of people. On September 19, all of the cubs lined up and vets were able to touch each cub's hip with the end of tongs. As the cubs became more comfortable, the vet staff would use a capped syringe and finally a blunted needle to put pressure on the hip area. The cubs were always free to leave the session and we would take steps backwards if they showed any sign of discomfort, including twitching their muscles, flicking their tails, or moving away. On September 28, when the cubs were 3 months old and one month after they had been caught up to receive their initial vaccinations, the first cub, Aslan, received a voluntary rabies vaccine. Due to some work on the lion building roof, training was scaled back for a few days, until October 13, when Aslan received his FVRCP and Elsa and Boma received their rabies vaccines. At this point the cubs weighed between 35 and 40 pounds.

The cubs would go on to be receive voluntary injections eight more times before their first birthday, and as time went on, the process included getting the cubs comfortable being separated into different stalls, as well as learning a "side" behavior so they would line up against the mesh without the need for a strategically placed log. The cubs also continued to enjoy visits from many of the zoo's other staff and guests who were able to observe and participate in the training process. This helped them increase their comfort level with a variety of people present. In addition, the cubs also learned "sit," "up," "paw," and "target" by the time they were 6 months old. The only limitation was that they only ate a small amount of meat each day, so training sessions were always pretty short.

We are all very proud of the progress of these cubs, and believe that their confidence and eagerness to learn has been enhanced by starting their positive reinforcement training at such a young age. We are also proud of the impact that the visibility of their care has had on all the visitors to the area. Even though the cubs started off small enough to handle, the amount of stress saved on the animals and staff alike has increased their quality of care as the cubs have grown to surpass 100 pounds. This has also allowed a continuation of the positive relationship that the cats have with their keepers, vet staff and other humans, and has helped the cubs become confident, endearing ambassadors that help the public fall in love with lions.

Acknowledgements

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Think Fun, Teach Survival

Amber White

National Aquarium

Several marine mammal and sea turtle rehabilitation facilities in the Greater Atlantic Region use similar types of enrichment devices and housing strategies to manage patients. Enrichment items such as foraging devices, hula hoops, carwash strips, sleds, sprinklers, and various textured surfaces can provide rehabilitating marine animals with physical and psychological stimulation, while maintaining animal health. The introduction of environmental enrichment into a daily routine within a rehabilitation facility is an overall effort to alleviate the stress induced by a sterile environment, create an outlet for continued natural behaviors, increase physical activity, provide opportunities for investigation and play, and decrease boredom often associated with a sterile setting. While some facilities may employ similar devices for enrichment, each has their own way of documenting the resulting information gained from the animals. The goal of this poster is to show you how the National Aquarium's Animal Rescue team dives into enrichment with the hopes of using standardized data collection to study the enrichment of rehabilitated animals. As wildlife rehabilitators, we must remember that wild animals already have acquired skill sets, behaviors, and experiences that they have gained from their natural environment-rehabilitation is only a minor part of their experience repertoire.

The Greater Atlantic Region (GAR) Stranding Network was formally established in 1982, and includes stranding teams from marine science and education organizations along the East Coast from Maine to Virginia. Where some facilities collect information on strandings, others including the National Aquarium's Animal Rescue team respond to and often rehabilitate stranded marine animals with the intent of releasing them back into the wild. In addition to its rehabilitation efforts, Animal Rescue collects data that benefit the scientific and conservation communities, provides outreach to the public and educational programming on current marine conservation issues.

The Animal Rescue team is permitted to take in pinnipeds (seals) and sea turtles under National Oceanic and Atmospheric Administration (NOAA) and US Fish and Wildlife Service (USFWS), but responds and aides in all marine mammal and sea turtle strandings within our coastal areas. With the number of animals stranding within the Northeast network increasing each year, it is important to continually update and enhance rehabilitation practices. In learning more about how seals and sea turtles behave in and adapt to their natural environment, rehabilitation facilities can better manage and care for each species and increase population numbers.

The Animal Rescue team is dedicated to providing the most humane care to marine animals in distress, and there are several ways that the veterinary and husbandry staff provides this high quality care. Upon the animal's initial arrival, our animal care team evaluates the disposition and overall body condition of each animal. Once a plan of action is established, the team can further test, examine, and care for the animal during their stay at our facility. Since rehabilitated animals are taken out of an environment they understand and recognize, and placed into a sterile environment to receive proper medical care, environmental enrichment is needed once the animal is medically stable. Wild animals are used to encountering countless objects and creatures in their natural environment, and enrichment, when deployed, can provide that same baseline mental and physical stimulation they seek on a daily basis.

Pinnipeds can live for long periods both in the ocean and on land. Reidman (1990) proposed that while cetaceans are in many ways one of the most highly specialized mammals for marine existence, the plasticity of adaptation to vastly different environments among pinnipeds is truly remarkable. Adaptations over the years have allowed pinnipeds to develop and refine their sensory systems providing an enhanced ability to navigate, forage, and communicate both in the water and on land; yet, there is still a plethora to be learned from these animals. Among marine mammals, tactile sensory abilities are well-developed, and this is especially true for seals.

Foraging and social behaviors are also categories that are continually studied. While there is still much to learn about the feeding events of many phocids, pinnipeds have demonstrated cooperative foraging situations which appear to improve the efficacy in the overall search for food. Pinnipeds are clever, playful, and curious creatures often demonstrating these attributes among their social groups. Reidman (1990) noted that play behavior is common among juveniles, as it is in many young mammals. Although in some cases play behavior may be simply for the entertainment factor, other times play is used as a learning tool. Behaviors such as aggression, sex, hunting, and socializing are all activities that can be learned through various "play" behaviors at an early age. Eisenburg (1981) adds that, although play in young animals may not be related to immediate survival, play behavior may be strongly associated with survival later in life. Social play is often seen as a prominent part of pinniped activities which include mock fighting, chasing, and leaping in social groups; or individual play with objects found in their environment such as rocks and kelp; or play with their own body-twisting, turning, and investigating. A seal's curiosity however, can also lead to dangerous encounters in their environment. Since these animals have no immediate fear of humans, they are more vulnerable to hunters and predators. Other hazards of a curious nature involve the ever changing status of their natural environment, the ocean.

Figure 1: Kemp's ridley eating a live blue crab.

Sea turtles spend the majority of their lives at sea, only breaking the surface for air and venturing to warm beaches during nesting season. In fact, most of the knowledge base on sea turtles stems from post-nesting females due to their availability for satellite tagging. Depending on the species, migration between feeding and breeding grounds can expand hundreds of thousands of miles, over vast oceans and through varying seasonal intervals. Resources for marine animals are not always predictable, and this is especially true for sea turtles, which have evolved their migratory patterns over the years to compensate for the environment; changing feeding grounds, learning new migratory routes through rough weather, and even altering their navigational cues. Not only is their sense of travel well-developed, but their curiosity also enhances the aspect of the sea turtle.

Sea turtles are also one of the more inquisitive marine species that can manipulate their environment to suit their current needs. Although their curiosity does not expand to quite as many areas as that of pinnipeds, sea turtles are overwhelmingly probing in regards to food items. As in the aforementioned text, diets vary greatly among the species of sea turtles even within our local oceans. While some dine on crustaceans and squid, others dine on various sea grasses and jellyfish. Being such a curious animal in a habitat that is prone to marine debris such as plastic bags, aluminum balloons, and even strings can cause much damage to these creatures.

It is when these animals come into contact with natural or unnatural sources that harm or injure them, that the Animal Rescue team steps in to rescue and rehabilitate. Injuries that are typically seen are entanglements in fishing gear or nets, boat strikes, predator wounds, and cold-stunning (similar to hypothermia in humans). Depending on the evaluation of the animal and the extent of damage, their stay in our rehabilitation facility could be anywhere from 3-6 months, unless otherwise approved by NOAA, USFWS, or the veterinarians. Most cases are generally released within the 6 month time frame; however, there have been a few cases over the years which have required further attention from our staff and longer term care before they were released. It is only when the animal is deemed stable, that environmental enrichment

can be added into their daily routine. Environmental enrichment among rescue and rehabilitation facilities is a field with vast amounts of research potential in its future. This paper focuses on the species specific behaviors exhibited in the animals our Animal Rescue team encounters and their view on the importance of enrichment, its implementation, and future goals regarding further research in this largely unexplored topic.

The habitat in which an animal lives consists of such a diverse mix of stimuli that the animal must respond on a daily basis in order to survive. Carlstead (1996) noted that an animal's life is affected by physical and biological factors, such as, social and spatial restrictions, the presence of other species, including humans, and the availability of appropriate stimuli for the development and expression of natural appetitive, defensive, and protective behaviors. Numerous research studies have shown that deprived of certain response-contingent stimulation in the environment, animals are denied the motive for controlling its own surroundings and fail to express appropriate behavioral patterns. Carlstead (1996) also adds that the main difference between captive and wild environments lie in the differential availability of control. When an animal is able to control the amount of incoming stimulation it learns to make further adjustments to its regulatory behaviors as it would in its natural habitat. "Managing the environment of the animals can increase their activity time, and also the amount of time the animals spend performing behaviors that they usually display in the wild, which is important in rehabilitation or educational setting" (Ortega, 1999). Introducing an animal to captive environment settings can affect their behavior drastically. This process can also induce different behavioral and stress responses in the animal such as boredom and stereotypies. These animals are already coming to the rehabilitation facilities compromised and under abnormally high levels of stress, so to help promote a healthy healing process, every avenue should be taken to relieve as much as possible.

Figure 2: Gray Seal foraging capelin out of a sled.

Abnormal behaviors can be a direct consequence of stressful situations. Therefore, one must take into consideration that if an animal's physiological needs are unsatisfied to any degree it is extremely unlikely that their psychological needs are being met. It has been demonstrated that "behavioral techniques can be designed for many species of wildlife to stimulate protective responses and reduce the impact of captive stress without endangering the welfare of the animal" (Van Wormer, 1990). This proposes that allowing an animal to choose the duration and intensity of a novel situation to which it is exposed may help decrease the negative effects of enrichment overall.

In an open environment an animal has the ability to approach, explore, attack, chase, escape, or avoid certain stimuli until the initial anxiety of the event is brought to an acceptable level. Within a captive environment, all animals should have opportunities to express these outlets in order to maintain stability during their stay in rehab. "An animal with more behavioral options will be better equipped to cope with stressful events in its surrounding environment or to alleviate boredom. Behavioral options can be improved by increasing complexity and variability of the environment physically, sensorily, and socially" (Carlstead, 1996). The introduction of environmental enrichment into a daily routine within a rehabilitation setting is an overall effort to alleviate the stress induced by a sterile environment, create an outlet for continued natural behaviors, increase physical activity, and decrease boredom associated with a captive setting. The notion of animal boredom suggests that "successful enrichment should enhance the active character of behavior, resulting in an increase in the frequency of interactive behaviors such as exploration, manipulation, play, and social interaction" (Wemelsfelder, 1999). Initially, a rescue and rehabilitation facility must generate an overview of environmental enrichment protocols. Here, one can identify, define, and categorize desirable and undesirable behaviors. In rehabilitation settings, environmental enrichment is useful in providing a well-managed facility with proper

Figure 3: Loggerhead at New England Aquarium, resting.

animal welfare opportunities by stimulating natural behaviors such as foraging, orientation, avoidance of predators, and social relationships. Species typical behaviors are best promoted by providing a complex and unpredictable environment, which in turn, improves the overall well-being of each animal. Not only is there a need to provide stability and variability throughout an enrichment plan, but species that (1) adapt quickly to new environments, (2) exhibits complex anti-predator behavior, and (3) have complex social structures, especially need to have a well-developed plan in place through their entire stay in a rehabilitation setting.

Since rehabilitation staff try to limit their interaction with rehab animals, adding enrichment devices can stimulate those same behavioral instincts without needing another animal or human interaction to elicit them. Providing animals with multiple enrichment opportunities in an unpredictable fashion increases the probability that the events will remain enriching, develop further socialization skills, and reduce habituation. Such organization would prevent the development of competitive and aggressive behaviors, control exploratory behavior, and avoid the establishment of a routine. Animals that are continuously stimulated, as they would be in the wild, are shown to further hone the skills needed for survival when released after captive care. The results from the Delfour and Beyer (2011) study demonstrate that all objects given to bottlenose dolphins (Tursiops truncatus) did not become "toys", but rather elicited several responses throughout the study including, but not limited to, ignoring the object, investigating, avoiding and playing. This proposes that habituation to enrichment could be reduced or avoided by removing the stimulus periodically and varying the objects presented. This also demonstrates that even if given an enrichment item that an animal may see in the wild, such as a boat buoy, they will not always be inclined to investigate the object or even approach the object. One cannot determine, in any given situation, how an animal will react to a stimulus, but we can aid the animal in honing the skills needed for survival-one of which is investigation.

Along with cognitive and sensory stimulation, socializing and play are also necessities that must be met while in rehab. Such interactive play includes chases, races, imitation, playful sexual behavior, and object manipulation. Play has long been thought of as an essential part of development both socially and cognitively. Among the pinnipeds that the Animal Rescue team encounters, play often occurs singly due to space available for rehabilitation and overall species monitoring while receiving care; however, Hunter et al. (2002) found that harbor and gray seals significantly increased random swimming and decreased pattern swimming when enrichment was presented whether in group or single holding environments. Pattern swimming is a behavior often observed when animals are bored and not properly stimulated in captive settings.

Figure 4: Seal with sprinkler enrichment while cleaning pool

In sea turtles, environmental enrichment, while not necessarily used to evoke play behaviors or stimulate imitation, devices can be used to develop cognitive and sensory stimulation. In a 2007 study on sea turtle enrichment, Therrien, Gastor, Smith, and Manire define their enrichment devices and the patterns of swimming that are generally observed. Enrichment devices used include water jugs with holes drilled into them, feedings mats, PVC foraging devices, and sprinklers. The study found that when no enrichment devices were present, 77% of the turtles' time was spent resting (periods of inactivity) and pattern swimming (swimming in repetitive patterns). When enrichment devices were provided, 88% of their time was spent in random swimming (non-pattern swimming) and focused behavior (investigation of the enrichment). This not only increased exploratory and novel behavior, but also suggests that environmental enrichment is just as effective for marine turtles as for other animals, and should be encouraged.

Several zoos and aquaria along the East Coast that participate in marine animal rescue and rehabilitation use the same types of enrichment devices and housing strategies. Our goals are to stimulate natural behaviors, increase physical activity, and provide opportunities for investigation and play while in such a sterile environment. Enrichment such as foraging devices, hula hoops, carwash strips (used as sea kelp), sprinklers, and mat textures can provide these animals with the stimulation they need to engage with their new environment without experiencing habituation and continuity that all rescues try to avoid. Just as many other departments within the National Aquarium that implement enrichment opportunities for their collec-

tion animals, Animal Rescue has classified and defined the behavioral goals and categories in which their enrichment devices or objects fall into which is viewable in Appendix A and B.

Enrichment Classification	Definition & Behavioral Goals
Foraging/Food	Foraging/Food enrichment provides the opportunity to search and work for food, thus encouraging species specific behavior such as, shredding, rummaging, hunting, and investigating.
Cognitive/Sensory	Cognitive/Sensory enrichment encourages the animal to problem solve, investigate, or manipulate their environments or to use their senses. The goal is to stimulate cognitive function beyond basic stimulus response and to encourage investigation.
Environmental	Environmental enrichment, or physical enrichment, changes the animal's living environment. The goal is to increase usage of their environment and promote exercise.
Novelty	Novelty, or play, enrichment is an object or device that the animal does not regularly encounter. The goal is to encourage investigation and adaptation skills that they will need in the wild to acclimate to ever-changing stimuli.

A daily log, as seen in Appendix C, is kept to record which item is given, the duration of interaction, behavior exhibited by the animal, interaction level ratings, and goal behavior ratings. In 2011, records of enrichment were being entered into an aquarium-wide TRACKS program where the frequency and timing of enrichment can be more closely monitored. An example of the TRACKS pages can be viewed in Appendix D. Graphs can be formulated to show staff which enrichment items elicit the most stimulation, and even which items are being used most often. Since the Animal Rescue team consists of mostly volunteers, this program and documentation effort will allow staff to not only speak about habituation and the importance of avoiding it, but can also show the volunteers what behavioral changes occur in the animals when an enrichment device that initially evoked a high interaction level is given on a regular basis.

The National Aquarium uses a comprehensive collection management system called TRACKS. This database assists with animal management in a variety of ways which include an inventory, husbandry and medical tool, increasing the accuracy and efficacy of data recorded, eliminating redundant data entry practices, and simplifying how we share data with other facilities. TRACKS allows the creation of a detailed history of each animal in the collection with a variety of reports that can be generated to reflect individual animals, as well as, the entire collection over time. Our Animal Rescue team uses this database to not only track daily husbandry, but also enrichment deployed throughout an animal's rehabilitation. We are then able to show volunteers the importance of environmental enrichment, and the role that they play in making sure that the animals receive a variety of items for the duration of their stay, as opposed to a sterile or routine environment. TRACKS also allows us the opportunity to demonstrate how environmental enrichment benefits these animals and promotes natural behaviors, so that we can get other facilities within our stranding network on board with using these same practices and techniques.

Animal Rescue tries to demonstrate the importance of keeping distance from these wild animals, as well as, not reinforcing any behaviors that have the potential to lead an animal to become attached to humans. While enrichment within rescue and rehabilitation facilities strive to stimulate these wild animals in positive ways, one needs to ensure that these items are not represented in their natural environment. More research is needed to determine how animals released into the wild behave after receiving enrichment in a rehab setting; however, as long as humans are continuously seen as negative and habituation to enrichment does not occur, the theory exists that the animals' survival instincts should remain intact as they were upon arrival. Beck (1991) points out that our attitudes towards animal welfare may be an obstacle in providing enriched environments that would prepare even captive-born animals for survival in the wild. As rescue facilities, we must remember that these wild animals already have skill sets, behaviors, and experiences that they have learned from their natural environment - rehabilitation is only a minor part of their experience repertoire. In determining whether or not reintroduction is a possibility for survival, candidates must demon-

strate the following behaviors which include (1) avoiding predators; (2) acquiring and processing food; (3) interaction with conspecifics; (4) finding or constructing shelter; (5) locomoting on various terrains; and (6) orienting and navigating through complex environments. The Animal Rescue team evaluates these behaviors as release dates near, and the opportunity to hunt and forage for live food is provided on a variable basis as enrichment.

More research on post-release monitoring and animal behavior in rehabilitation settings is needed for the further development in this growing field. In my opinion, the National Aquarium's Animal Rescue team could lead the way in such research and even contribute enrichment strategies in the wealth of knowledge that our Greater Atlantic Region Stranding partners hold. With a goal of sharing information, gathering more strategies to best achieve this high standard in animal husbandry, and communicating with our partners to best employ these practices, the National Aquarium's Animal Rescue team is well-prepared to start this journey in establishing an enriched environment for rehabilitated marine animals to encounter.

Appendix A

Seal Enrichment

Item	**Behavioral Goal**	**Safety Protocols**	**Usage Level****	**Goal Rating*****
Water Jug	Foraging & Cognitive/Sensory	Not left overnight	1-3 rating	1-5 rating
Orange Bucket	Foraging & Cognitive/Sensory	Not left overnight	1-3 rating	1-5 rating
PVC Feeder (elbow)	Foraging & Cognitive/Sensory	Not left overnight	1-3 rating	1-5 rating
PVC Feeder (tube)	Foraging & Cognitive/Sensory	Not left overnight	1-3 rating	1-5 rating
Ice Cubes (small)	Foraging & Cognitive/Sensory		1-3 rating	1-5 rating
Ice Cubes (large)	Foraging & Cognitive/Sensory		1-3 rating	1-5 rating
Blue Basket	Foraging & Cognitive/Sensory		1-3 rating	1-5 rating
Live Food	Foraging & Cognitive/Sensory	Not left overnight	1-3 rating	1-5 rating
Orange Sled	Cognitive/Sensory & Environmental		1-3 rating	1-5 rating
Pink Sled	Cognitive/Sensory & Environmental		1-3 rating	1-5 rating
CD Player	Cognitive/Sensory (Auditory Only)	Only used out of enclosure	1-3 rating	1-5 rating
PVC "Kelp"	Environmental		1-3 rating	1-5 rating
Frisbees	Novelty		1-3 rating	1-5 rating
Sprinklers	Cognitive/Sensory & Environmental	Not left overnight; Not left in enclosure	1-3 rating	1-5 rating
Hula Hoops	Environmental	Not left overnight	1-3 rating	1-5 rating
Bucket Lids	Novelty		1-3 rating	1-5 rating
Yellow Crab*	Novelty	Not left overnight	1-3 rating	1-5 rating
Purple Octopus*	Novelty	Not left overnight	1-3 rating	1-5 rating
Knot Toy*	Novelty	Not left overnight	1-3 rating	1-5 rating
Yellow "Jack"	Novelty	Not left overnight	1-3 rating	1-5 rating
Jolly Balls (large)	Novelty		1-3 rating	1-5 rating
Pool Buoys	Novelty		1-3 rating	1-5 rating
Large Dice*	Novelty		1-3 rating	1-5 rating
Ball in Ball	Foraging & Cognitive/Sensory	Not left overnight	1-3 rating	1-5 rating
Athletic Balls	Novelty		1-3 rating	1-5 rating
Bubbles	Cognitive/Sensory (Visual Only)		1-3 rating	1-5 rating

*These are either very durable dog toys designed for large dogs, or some are even designed for horses.
**Usage ratings are interaction levels, observed by staff or volunteers, that the animal exhibits:

(1) No Interaction
(2) Low Interaction
(3) High Interaction

***Goal ratings are designated by staff based on observations from volunteers on the enrichment given:

(1) No Response (completely ignoring the enrichment)
(2) Fearful (immediate movement away from enrichment)
(3) Inappropriate (example: sexual display on a foraging "toy")
(4) Species Appropriate (Vocalizing, chasing, investigating, etc)
(5) Goal Behavior (Does the animal do what you were trying to evoke?)

Appendix B

Sea Turtle Enrichment

Item	Behavioral Goals	Safety Protocols	Usage Level*	Goal Rating**
Plastic Disc	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Orange Sled	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Pool Buoys	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Plastic Bowling Pins	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Frisbees	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Target Pole	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Athletic Balls	Cognitive/Sensory & Novelty		1-3 rating	1-5 rating
Scratching Station	Cognitive/Sensory (tactile)	Not left overnight	1-3 rating	1-5 rating
Sprinklers	Environmental	No hoses in the water	1-3 rating	1-5 rating
Hula Hoops	Environmental	Watch for ziptie chewing	1-3 rating	1-5 rating
PVC "Kelp"	Environmental		1-3 rating	1-5 rating
Live Boxes	Environmental	Watch for biting sides	1-3 rating	1-5 rating
Sunlight-Basking	Environmental	STAFF ONLY	1-3 rating	1-5 rating
Ice Cubes (small)	Forage & Cognitive/Sensory	Watch for aggression	1-3 rating	1-5 rating
Ice Cubes (large)	Forage & Cognitive/Sensory	Watch for aggression	1-3 rating	1-5 rating
Metal Buckets	Forage & Cognitive/Sensory	Watch for aggression	1-3 rating	1-5 rating
Live Food	Forage & Cognitive/Sensory	Watch for aggression	1-3 rating	1-5 rating

*Usage ratings are interaction levels, observed by staff or volunteers, that the animal exhibits:

(1)No Interaction
(2)Low Interaction
(3)High Interaction

**Goal ratings are designated by staff based on observations from volunteers on the enrichment given:

(1)No Response (completely ignoring the enrichment)
(2)Fearful (immediate movement away from enrichment)
(3)Inappropriate (example: sexual display on a foraging "toy")
(4)Species Appropriate (Vocalizing, chasing, investigating, etc)
(5)Goal Behavior (Does the animal do what you were trying to evoke?)

Appendix C

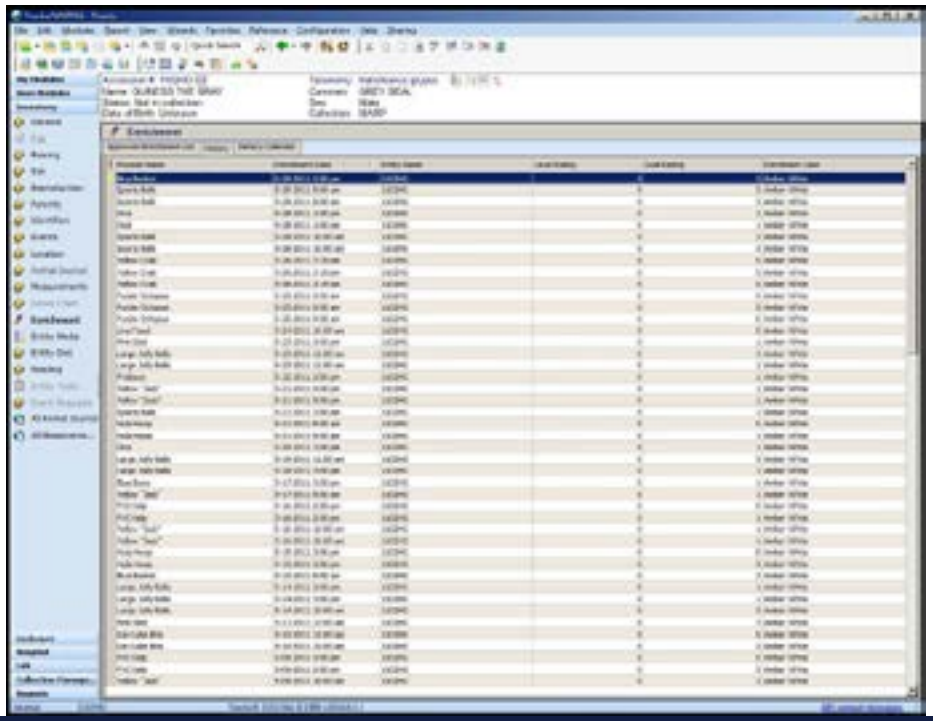
Enrichment Log

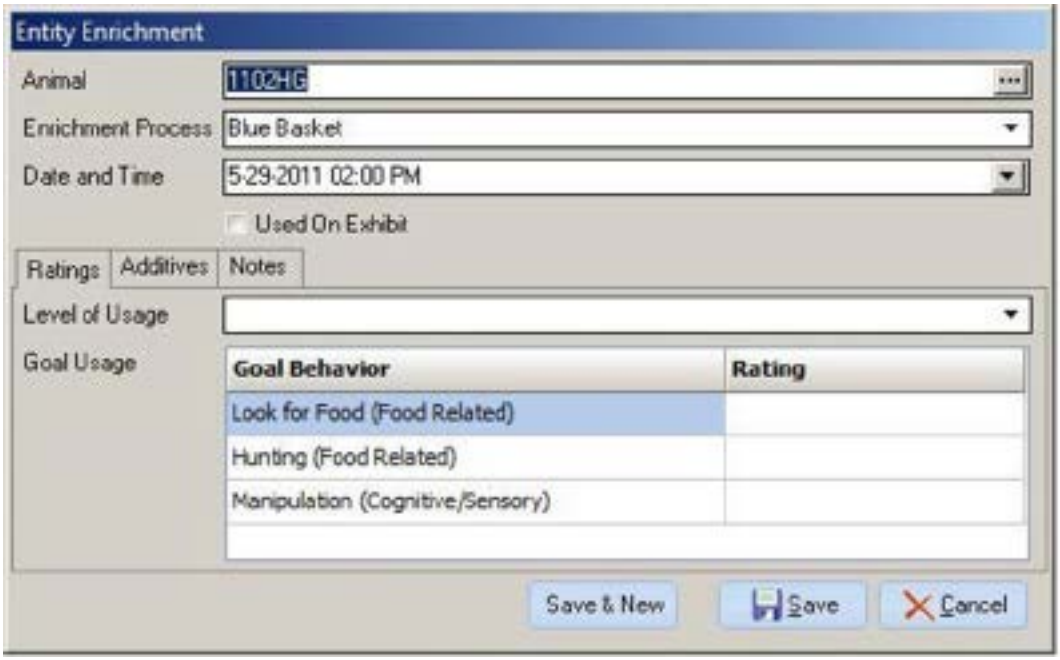
Date	Enrichment Item	Time in/Out	Reaction	Usage Rating	Observations

Appendix D

Tracks Module for Tracking Enrichment

This is a snapshot from our TRACKS Modules. This database allows us to list, rate, and track enrichment devices with all of our animals that come through rehabilitation. Then we are able to demonstrate which enrichment items are best utilized and perhaps those that are being used too often.





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Paw Crate Pedicures with Amur Tigers

Celess Zinda

Oregon Zoo

The Oregon Zoo, home to 1.1 Amur Tigers (Panthera tigris altaicia), was in need of some up close and personal nail care in 2012 when radiographs during a routine physical exam showed that one of our female's front left digits was showing bone loss and a permanent abnormal growth pattern. Our options were to remove the digit or implement a training plan to enable us to keep the claw trimmed enough that it would not cause her injury. Tiger claws had previously been cared for in paw presents at the mesh of indoor holdings while the tigers were in a sit position. Once this abnormal growth pattern was discovered the keeper team determined that we would need to be able to use a Dremel tool for an extended period of time and our tigress was not comfortable enough in a sit position for this to be possible. Keeper staff salvaged an old polar bear paw crate which was attached to our existing training crate and a paw present was trained. Once trained, keepers were successful in maintaining a filed claw on the abnormal digit and our tigress was so much more comfortable in the crate for her pedicures that she would hold her paw in there for extended periods of time during presentations and tour groups.

When working with large carnivores like Amur Tigers (*Panthera tigris altaicia*) in a protected contact setting, it is important to establish and maintain some basic husbandry behaviors in order to assess the animals' overall health on a daily basis. At the Oregon Zoo, one of these basic husbandry behaviors is a "paw present," which allows keeper staff to get a close-up look at the pads of the tigers' paws and the condition of their retractable claws (Figure 1). Nothing out of the ordinary was observed with these daily checks of female 14-year-old-tiger Nikki's claws until the time came for her routine annual physical exam. For physical exams, we anesthetize our 1.1 tigers in their training crate (Figures 2 and 3) via a voluntary IV induction into the lateral tail vein. While the tiger is anesthetized, radiographs can be taken which helps vet staff get a better look at an animal's health. During the physical exam of April 2011, vet staff found the nail of Nikki's right paw, digit 2 (D2), to be excessively long, nearly to the pad, and during manipulation of the digit found that it did not extend and retract as well as the other digits (Figure 4). Due to this finding, vet staff decided to radiograph Nikki's paws to see what, if anything was going on under the surface. Radiograph analysis showed an abnormal bone growth pattern and bone loss (lysis) of phalanx 3 (P3) of the second digit (Figure 5).

Figure 1

Figure 2

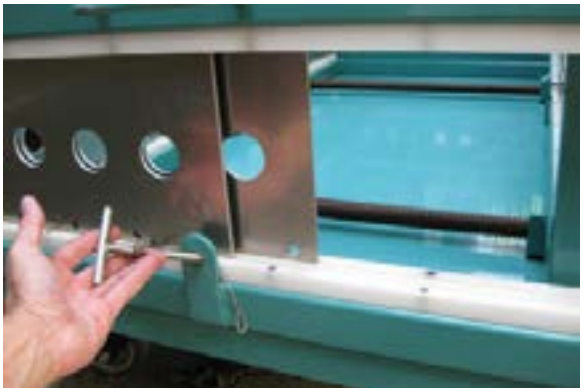
Figure 3

Figure 4

Figure 5

Keeper staff and our veterinarian team discussed potential issues with the claw that could arise in the future if no action was taken. If left alone, the potential injury to Nikki was high as the claw would continue to grow down and back into the pad of her paw. The options for care of this claw were either to keep it trimmed manually, or to amputate the affected phalanx. The average life span for Amur tigers is 14-16 years. Even though Nikki was considered elderly at 14 years, she still had the potential to need care of this paw for many more years. As animals age the risks involved in anesthesia increase, and ultimately keeper and veterinary staff were hoping to avoid further surgery to amputate the digit in question.

The current paw present behavior was trained with the following discriminative stimulus (S^D) and criteria:

S^D: A verbal "Paw" is given with hand raised up on the side of trainer's body to chest level, fingers spread and palm facing forward (trainer's right hand for animal's left paw; trainer's left hand for animal's right paw), place hand on mesh where you want paw to go

Criteria: Animal places paw up onto mesh where trainer's hand is and allows for tactile until bridged

While this "paw present" behavior was trained well and had proven useful for daily checks, tactile, and claw trims, the positioning of the paw seemed to cause discomfort for our tigers for long periods of time, and the Dremel tool (Figure 6), which would make Nikki's claw maintenance more efficient would not fit through the mesh. Despite these obstacles, Nikki's willingness to participate in training sessions and the flexibility of the training crate with its different access panels made keepers feel strongly that they could manage the growth of Nikki's claw with regular trimming. An abandoned paw crate originally built for voluntary blood draws with our polar bears was found to be the perfect size for our tigers' paws, and was retrofitted by our maintenance staff to be attached to the closed end of our feline training crate (Figure 7).

Figure 6

Figure 7

Using respondent and operant conditioning, keeper staff introduced the tigers to the new paw crate and began slowly acclimating them by feeding the tigers in their training crate with the new paw crate attached (Figure 8). The tigers' experience in the training crate has been made very positive over the years by giving them food and desirable treats, such as diluted powdered goat's milk, while positioned in the crate.

Figure 8

The tigers were already trained to do a "down" behavior where they lie down ventrally while maintaining eye contact with their trainer (Step one). Step two was to reinforce this same behavior in the training crate with the tiger facing the paw crate with both of their front paws sticking out in front of them (Figure 9). Step three was to introduce a wooden dowel as a "paw target" (Figure 10). The trainer introduced the wooden dowel by reaching through the paw crate, through the opening in the sliding panel of the training crate, and bridging when the dowel touched the top of the tiger's paw while in a "down" position. Once the trainer was confident that the tiger would not attack the wooden dowel, it was placed slightly above and in front of the tiger's paw, waiting patiently for the tiger to lift the desired paw and touch the dowel, Step four (Figure 11). The trainer only bridged when the paw touched the dowel. The trainer then began placing the dowel on the front edge of the entrance to the paw crate, Step five (Figure 12). Bridging only occurred when the tiger's paw touched the dowel (Figure 13).

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

In small increments, the dowel was moved further into the paw crate with the same criteria, and the tiger's paw had to touch the dowel in order to receive the bridge and reward. The hand cue was introduced at this time, which was the hand palm up, fingers spread, and placed under the paw crate (Figure 14 and 15). Once the tiger was consistently performing the desired criteria the wooden dowel was removed and the trainer only used the hand cue to ask for the paw present in the paw crate. The next important piece was to extend the amount of time that the tiger held the paw in the paw crate, as the time needed to file down Nikki's problem claw could vary.

Figure 14

Figure 15

The final step in this behavior was adding a secondary trainer to begin "paw tactile" in the paw crate. The secondary trainer began by using a wooden tongue depressor to touch all over the tiger's paw while in the paw crate, not only the top of the paw but in between each digit and under the paw as well; the tongue depressor would later be used to hold the fur away from the claw while clipping and filing (Figure 16 and 17). The secondary trainer also incrementally introduced all the other tools we needed for this process, including a head lamp, claw clippers, and the sound of the Dremel tool.

Figure 16

Figure 17

In our department we do not consider a particular behavior completed until it has been performed consistently, meeting the same criteria, for three different trainers. Nikki completed this behavior in about 4-6 months and keepers were able to maintain an appropriate length of her affected claw to minimize the progression of health risks related to her bone loss. The paw crate became so positive for Nikki that she would hold her paw in the crate for tour groups and remained relaxed as long as keepers needed to keep the claw filed. Keeper staff also trained this behavior with our male tiger, Mikhail, in 2014. The flexibility allowed by the sliding doors of the training crate enabled us to be able to switch which side, left or right, that the paw crate was attached. We are now able to safely maintain claw length on either front paw. The end criteria for the paw crate behavior are as follows:

S^D: A verbal "Foot" is given while presenting whole hand palm up and fingers spread directly under the paw crate. Which paw presented depends on which side of the crate the paw crate is attached. For example, if paw crate is on trainer's right side, ask with trainer's right hand and tiger should present left paw, and vice versa.

Criteria: Animal places desired paw inside paw crate fully and keeps paw there for duration of nail trimming session. Selectively bridge and reinforce for remaining in the paw crate. Secondary trainer uses a tongue depressor for paw tactile and the clippers, Dremel tool, and head lamp if necessary.

I would like to thank all of the Marine Life staff at the Oregon Zoo, especially the lead trainer for the paw crate behavior, Nicole Nicassio-Hiskey, as well as our amazing vet staff and curator involved in the diagnosis and management our animals. Special thanks to my editors, Jen Degroot and Dr. Tim Storms, DVM.

A Slam Dunk! Using Creative Training Techniques to Achieve Multiple Goals while Training Caracals and Cheetahs

Beth Foster

Oregon Zoo

Many zoos focus on the use of operant conditioning techniques to train medical and husbandry behaviors. These behaviors help us in our daily routine as well as allow us to take better care of the animals we work with. But what happens once you've taught all of the husbandry behaviors that are needed? This is where creativity and fun come into play! At the Oregon Zoo, we have a training program with our cats that includes typical husbandry behaviors, as well as many silly behaviors. With creativity as one of our driving forces, the keepers here decided to explore more advanced ways of interacting and training with the animals in an effort to accomplish several goals: 1) provide the animals a higher level of mental and physical stimulus, 2) use up the outside exhibit space more for these activities, 3) encourage natural behaviors, 4) provide the guests with a rare opportunity to watch training sessions and 5) dispel some of the guests' myths about why and how we train animals in zoos. In this paper I will discuss how we accomplished these various goals by creating a "fetch and dunk" behavior to encourage our cheetahs to run and a meat toss game that showcases our caracals' jumping abilities.

Our initial interest began with our two male cheetahs, Ranger and Strike. Despite the fact that their training and enrichment program is fairly extensive, we have found that they are typical cats and can be pretty lazy if not challenged in the right way. We already knew that many institutions use dog lure courses with their free contact cheetahs, creating opportunities for this species to exhibit their running abilities. But with our cats being protected contact, we found that using this within the boundaries of our exhibit had too many challenges to be successful. We soon decided that a lure course was not the best way to elicit the run behavior from our cheetahs. After giving it some thought, we agreed that a toss and fetch game of some sort might be a more realistic option for us to accomplish the same goal. This is when the idea of the "Cheetah Chuck-it" came to life!

Many dog owners enjoy the benefits of using a toy called the "Chuck-it" with their dog. This toy allows for a long distance, very energetic game of fetch between dog and owner. Having already used this many times with my dog, I knew this would be a great way to get the long distance range we were hoping for to elicit the run behavior with the cats. Unfortunately, unlike my dog, the cheetahs were unimpressed with the ball and would not instinctually run after it when thrown. In fact, the only thing that they did do instinctually to the ball, once they actually paid attention to it, was to begin to chew it up. We quickly realized that we would have to use a different ball than what comes with a standard "Chuck-it", and we would have to start from square one with teaching these cats how to play fetch. This proved to be a huge challenge for both the cats and the trainers, but also ended up being one of the most fun and creative behaviors that I've ever trained!

We tried several different types of balls at first, but finally settled on a small boomer ball that was more durable than the others. Step one was to teach them to target to the ball. We began each session by dropping the ball into the stall through the food chute and would use that same ball throughout the entire session. It was important to make sure that the ball remained somewhere close to the front of the stall and didn't get pushed to the back where the cat could not easily be lured to it. This took many tries and different strategies, but eventually we found that we needed to use wire to secure the ball to the inside mesh at the

front of the stall to prevent this from happening. We were able to get them to go to the ball on cue fairly easily this way. This completed the step of having them go to the ball on cue.

The next step was one of the harder steps in the process. It was teaching them how to pick up the ball. We started by just encouraging the cats to bite the ball. We kept it secured it to the mesh, but raised it up approximately 12-13 cm (about 5 inches) above the ground for this stage. Once they knew that the cue "fetch" meant to go to the ball and bite it, we detached the ball from the mesh and began giving the cue with the ball free in the stall. We now needed them to not only go to the ball and bite it, but they also had to pick it up. This is when we realized how difficult it was for them to actually pick up the ball that we were using at that time, so we began making modifications to it to see if we could make it easier for them. After much trial and error, we finally decided to try a different ball altogether, and we eventually settled on a 12.7 cm (5 inch) "Jolly Pet Teaser Ball" . This is durable enough to withstand the cheetahs biting it, doesn't encourage them to chew it up, has holes to allow their teeth to bite around it when picking it up, and is small enough to fit into their mouth well. The only bad thing about it was that it was too big to fit into the standard "Chuck-it" toy, so our hopes of using this tool for our game then faded. We had now completed the steps of having them go to the ball and pick it up.

After this difficult step was taught, we had to begin teaching the cats how to bring it to us. We started this by having them hold for longer periods of time and then slowly increasing the distance they had to go to get to the ball. We went back to starting the session by dropping the ball into the stall through the food chute and then using a pole to hit it back into the stall each time the cat fetched it and brought it to us. It was at this point that we decided to have a receptacle of some sort to have as a designated spot for the cheetahs to drop the ball at. We choose a large PVC curved pipe due to its sturdy design and because it would allow the ball to roll back out once dropped in. This was mounted inside the stall and became the end point of our "fetch" behavior. We continued shaping this part inside their holding until they were reliably going to the ball at various distances from the trainer, picking it up, returning to the trainer, and then dropping it into the PVC tube.

At this point, all we needed to do was to move the behavior outside. We tried to replicate as much of what we did inside to the exhibit. We would initially throw the ball over the fence to start the behavior and again use the pole through the mesh to push it back out from the fence into the yard once the cat dropped it through the tube after fetching it. Eventually we decided to replace the PVC tube with a standard 5 gallon bucket and to start using multiple balls during a session. This allowed us to not have to worry if the ball didn't roll into a good spot for us to hit with the pole again after each "fetch".

The cheetahs progressed well and eventually we began being able to throw the ball out farther and farther into the exhibit. This is when we really began to capture the running behavior that we had been hoping for, and the differences in each cheetah's personality really became apparent. Once they did this reliably, it was time to start using something to help us hit the ball farther into the exhibit. Since the "Chuck-it" that we initially intended to use was too small for this larger ball, we opted to try a tennis racket. This was one of the hardest steps for the trainers to learn. Hitting the ball with the racket over the 4 meter (13 foot) fence was a definite learning process that sometimes had us ducking for cover. Though, once mastered, we were able to hit the ball deep into the exhibit often times creating a fantastic game of chase that had the cat running, jumping, batting and chasing the ball, using instincts that they do in the wild! I had never seen these animals so focused, engaged or so active in the several years that I had been taking care of them. This was a huge success!

Over the next few months, we kept adding things to the behavior such as multiple buckets along the fence line, multiple people/strangers watching along with the trainer and eventually an actual "Chuck-it"!! We were able to find a larger sized toy that, with a bit of modification, was able to fit the ball that we were using perfectly. This allowed for us to throw the ball much further with much less practice, and it was the final touch on an amazing behavior.

Even though I was spending a lot of time training this behavior to the cheetahs, I also began thinking of similar ways to accomplish some of the same goals for our caracals. We have one male caracal named Cricket, who is very motivated and energetic when interacting with the trainers. Historically though, the caracals are fairly elusive while on exhibit and tend to hide in spots where visitors cannot see them. It is very

common for me to hear visitors say that they never see the caracals. Keeping this in mind, I began making my mid-day feed for him out on exhibit instead of inside holding, so that the visitors could watch and ask questions. Cricket, being already very conditioned to being in front of a lot of people, quickly responded to coming to the front of the exhibit to be fed . This by itself was a great way to accomplish the goal of getting the visitors a better experience at the exhibit, but I knew it could be more.

One of the greatest abilities that these small cats have is the ability to jump several feet straight into the air and catch prey mid-flight. We have graphics explaining this in front of their exhibit, so this seemed like the perfect behavior to try to elicit with a training session. After thinking of various ways in which I could encourage him to jump, I simply began by tossing small meatballs into the exhibit through the mesh to see what he would do. Surprisingly, Cricket attempted to catch the meatball in mid-air right away! Without even really trying, I had figured out an easy way to get this cat to jump high off the ground to catch his food. Knowing how eager he was to catch the meatballs already, it was just a matter of figuring out a great way to showcase this.

I decided to make this a fun game of "basketball" between us, where I am the one trying to make a free throw into a "basket" and he is the shot blocker. I started by hanging a standard 5 gallon bucket from the top exhibit mesh towards the back and used this as the basket. While I stood at the front of the exhibit, I trained Cricket to station just on the other side of the small creek that runs along the front of the exhibit. This allowed him to have a good starting point for each round of the game. The session simply consists of me attempting to throw small meatballs through the mesh into the bucket while he attempts to catch them or block them mid-air. The process of fully implementing this game went quickly, since I did not have to actually teach him to jump for the meatballs. Cricket just did this instead of waiting for them to drop to the ground before retrieving them. He often times will jump several feet into the air to catch the meatballs, and rarely do I ever actually make a basket. If I do end up making a basket, the bucket is low enough that Cricket can tip it over to retrieve his snack. Not only does this game encourage him to jump for his food just as caracals do in the wild, but with all of the "blocked" shots that happen throughout the game, Cricket ends up splattering meat all over the area and he ends up with a nice scatter feed to enjoy at the end of the game!

So what have I learned from all of this? First I learned that both of these amazing behaviors, "fetch" and "basketball", came from being creative and just playing around with the animals in an effort to see what amazing things they can do and what novel ideas may pop into my head . By raising the bar for the type of care I provide, I was able to set some new, challenging goals that pushed me as a trainer and pushed the animals to engage in training sessions in a much more intense and energetic way . Both of these behaviors created new opportunities for guests and for our volunteers as well. Not only do the visitors get an opportunity to see these animals up and moving in new and exiting ways, but they also get to learn about why we teach these types of behaviors, since volunteers often times now will do their talks while I am doing a session. The volunteers find that they now have a captive audience and are able to discuss how these sessions encourage the natural behaviors that are described in the exhibit graphics. They also are able to have more time to discuss the zoo's conservation message with the guests as they watch these sessions.

I've also learned that teaching these types of behaviors has created a deeper bond between the individual animals and me. I feel as if I understand their abilities and patterns of learning much better now, and that they have a heightened level of focus during sessions that they did not have before. I have a deeper respect for them as both athletes and students, and this has made me love training even more (which I didn't think was possible!)

Most importantly, I learned to never under estimate the animals I take care of or myself as a trainer. Even though these behaviors took a long time to shape and complete, by not giving up and being flexible with my plan based on each individual animal's needs, I was able to achieve multiple goals that I hadn't even realized where so important to me, the zoo, the guests, and most importantly, the animals .

Integrated Holistic Approach to Managing Elephant Welfare

Erin Ivory and Dr. Corrine Kendall

North Carolina Zoo

Improving elephant welfare requires a holistic management approach that integrates behavior management, health care, and research. At the North Carolina Zoo, elephant care staff are working closely with veterinary and research staff to ensure that the effects of changes in management are carefully monitored and quantified. Behavior management incorporates the assessment of the environment in conjunction with behavior of the individual and group, then utilizes variability in the environment to achieve changes in behavior. In the last year, the elephant care staff have been able to use behavioral management to improve socialization and habitat access by creating complex social groupings of 2.4 elephants. At the same time, changes to diet which include reduced grain, increased browse, andaddition of a new hay balancer, are being carefully monitored by veterinary staff and researchers who are assessing micronutrients in browse and in the elephants. In addition, research staff at the zoo are using novel stable isotope techniques to go beyond body condition scoring to monitor changes in body, and specifically, fat composition in the elephant herd, as changes to exercise level and diet are made. Ongoing behavioral research, done in conjunction with undergraduate students trained at the zoo, also provides background information on elephant activity during the day and with a video system at night. This behavioral research provides vital information on how elephant behavior is being affected by various management changes and is helping to assess existing opportunities for stimulation and protection from the elements.

Increasing Contra-Freeloading Behavior in a North American River Otter by Using Operant Conditioning

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Lincoln Park Zoo

Contra-freeloading is observed behavior in most animals that when offered a choice between food provided or food that requires effort, the animal prefers the food that requires effort. However, due to captive management it is not uncommon for some animals to lose their motivation to forage or problem solve for food. At Lincoln Park Zoo 1.0 North American river otter (Lontra canadensis), Odie, has shown a lack of motivation for solving puzzle feeder enrichment devices. In this study a trainer will use operant condition to teach Odie how to solve a novel feeder puzzle device designed for this study in hopes it will increase his interaction with the item outside of training sessions. By training Odie to carry out the mechanical behaviors needed to successfully solve the feeder puzzle his confidence and motivation should increase when presented with this device or similar devices in the future outside of a training session. The intrinsic motivation of contrafreeloading may be strengthened by having a strong reinforcement history with solving puzzles. Data will be collected using an ethogram program (Zoomonitor) which will provide activity budgets prior to training and after training has been completed. Although only one subject and one species will be involved, this study may provide preliminary evidence for this procedures' effectiveness in increasing contrafreeloading in some captive animals.

Introduction:

Foraging is one of the most frequently observed behaviors noted in "wild" animals' activity budgets. In zoo environments, however, animals are provided a prepared diet to meet their physical needs, often without requiring the physical or cognitive effort that would have been used in their natural habitat. As a result of this some animals may lose their drive to work for food. In order to provide more complexity to captive animal's lives, food-related enrichment is utilized. The Association of Zoos and Aquariums defines enrichment as "a dynamic process for enhancing animal environments within the context of the animals' behavioral biology and natural history. Environmental changes are made with the goal of increasing the animal's behavioral choices and drawing out their species-appropriate behaviors, thus enhancing animal welfare (Enrichment, 1997-2014)."

Surprisingly, when given the choice between free food and food that requires effort to acquire, some animals have been shown to prefer to work for food, a phenomenon called contrafreeloading. This behavior has been observed in a variety of different species ranging from rats to primates. Inglish and Ferguson found that "starlings preferred to obtain 72% of their food by working even if identical food items were freely available" (Day, J.E. L.; Kyriazakis, I. & Rogers. P.J., 1998). Forkman (1993) found similar results in gerbils who preferred to obtain, on average 67% of their food by digging. One suggestion for why animals prefer to work for food is that there may be some intrinsic motivation for certain species to perform foraging or hunting behaviors (Jensen, 1963). This hypothesis draws largely from the idea of behavioral needs, or certain actions that animals are driven to perform even in the absence of their functional need. Although this possibility cannot be ruled out, it has also been proposed that the act of working for food may actually be reinforcing and promote the behavior (Alferink, Crossman, and Cheney, 1973). Osborn (1977) argued that contrafreeloading is the byproduct of the combination of the conditioned reinforcement of the behavior with the resulting stimulus changes.

However, as some studies on contrafreeloading have documented, not all individuals are properly motivated to work for food and it is not uncommon to see animals sway more towards the free loading mantra (Young and Lawrence, 2003). At Lincoln Park Zoo, a male river otter, Odie, has historically shown a lack of motivation for solving complex puzzle feeder enrichment devices. Based on the conclusion stated by Osborn (1977) above, the following study sought to evaluate if Odie's contrafreeloading behavior could be promoted through operant conditioning to solve the puzzle feeders and if his interactions with puzzle enrichment would increase outside of training sessions. We hypothesized that this would occur as a result of creating a strong reinforcement history with the behaviors needed to solve each puzzle, resulting in the trained behaviors becoming conditioned reinforcers.

Methods and Materials:

Subject:

We observed 1.0 North American river otter, Odie, (12 years old) who is housed with 0.1 conspecific at Lincoln Park Zoo. Both otters have been living together in this enclosure since 2005. At Lincoln Park Zoo the otters are typically fed two to three times a day. Due to specific nutritional requirements, weight control, and to avoid possible food aggression the otters are separated for feeding and fed in their holding area. This food is presented in a variety of ways ranging from free feed, complex enrichment devices, or operant conditioning training sessions.

Odie has historically shown a lack of motivation for solving more complex puzzle-feeder enrichment devices. Based on keeper observations, Odie does interact with basic puzzle feeder enrichment devices but will usually choose the simplest option first, and as the level of difficulty increases he commonly loses interest. When presented with a puzzle device he will typically start interacting with it by using his paws or nose to push the puzzle around forcefully. If this doesn't work he reverts back to his tried-and-true strategy of dumping enrichment into the water, which results in all the food floating out.

Data Collection:

We conducted 15 min. behavior observations of Odie before (n=8), during (n=16), and after (n=9) training to solve the puzzle feeder devices. Before an observation, Odie was temporarily housed in an off exhibit holding area so the food and enrichment devices could be placed in the exhibit. All observations were conducted immediately after Odie was given access to the exhibit. Odie's overall activity budget was recorded using the ZooMonitor application (Wark et. al, in prep) by instantaneous point-sampling methodology with 1 min. intervals. Also, the frequency and duration of interactions with the free food pile and enrichment device were recorded continuously during observations using pen and paper.

Treatment Phases:

Phase 1 (Pre-training)

During the entire study, Odie was fed half of his morning or evening diet prior to being given access to the remainder of his food on exhibit. The second portion of his food was split between a puzzle feeder enrichment item and a free feed pile. Both the food pile and the focal enrichment items were offered to him in the same location every day.

Phase 2 (Training)

Half of his morning diet was offered to him in a free shaping training session prior to being given access to the exhibit. The remaining portion of his diet was then split into a free feed pile and loaded into a focal enrichment device on exhibit. During this phase, one to four training sessions were done in a day with the puzzle devices. Training sessions took place in a holding area off exhibit. Not all training sessions were followed with access to enrichment items on exhibit, but the majority were.

Phase 3 (Post-training)

This phase began once Odie was reliably able to solve the enrichment puzzle devices during training. Training sessions were ended during this phase. Odie was fed half of his morning diet prior to being given

access to the remainder of his food on exhibit. The second portion of his food was split between a focal enrichment item and a free feed pile. Both the food in the pile and the focal enrichment items were offered to him in the same location every day.

Puzzle Feeder Enrichment Devices

Two main enrichment devices were used interchangeably for the duration of the study.

1. Puzzle box – this item was designed and created to be used for this study. Box was made out of natural looking materials so it could be put on exhibit. The box was a 3 ft. by 3 ft. square, which was broken up into four separate chambers. Each chamber had a different puzzle to be solved in order to retrieve food. The puzzles varied in difficulty.

Chamber one has a lid that could be opened when pushed or pulled up. Chamber two had a slide door with a vertical handle attached to it. Pushing or pulling the handle in one direction could open the door. Chamber three was a circular, flat dial with a triangular cut out in it. Beneath the dial were two separate boxes where food items could be placed with a solid area in between them. In order to complete this puzzle the dial needed to be turned and lined up with the triangular cut out containing the food box below. The fourth chamber had a latch on it. In order to solve this puzzle the latch would need to be lifted and then the lid would need to be pushed up to access the food inside.

Chamber 1 *Chamber 2* *Chamber 3* *Chamber 4*

Figure 1
Visual representation of puzzle box chambers and their mechanics

During phase one, Odie was able to solve chambers one though three with no additional help from training. He was never successful solving chamber four, during phase one, which lead us to using this chamber as the focus of the training sessions during phase two.

2. Sheet box- this device was a 1 ft. by 1 ft. square box with holes around 5 out of 6 of its sides. A sheet was attached to the corner of the box and food was rolled into the sheet. The sheet end was then fed into the box with a small amount of the sheet sticking out. The sheet would need to be pulled out and unraveled in order to retrieve the food.

This enrichment item was also the focus of training sessions during phase two.

Results:

Activity Budget

During observations, Odie spent the majority of his visible time swimming (37.8%), interacting with the focal enrichment device (30.5%), eating (16.3%), and locomotion (9.6%). Some differences across the three phases were noted. Odie spent less time interacting with the enrichment devices during the Training phase (Mean=19%, SE=2) and more time swimming (Mean=55%, SE=3), compared to before training (Enrichment Interaction: mean=45%, SE=6; Swimming: mean=16%, SE=3) and after training (Enrichment Interaction:

mean=32%, SE=6; Swimming: mean=35%, SE=5).

Food and Enrichment Interactions

Although Odie displayed an overall trend towards fewer interactions with the enrichment devices during the study (Mean interactions / session +/- SE: Pre-training=4.4 +/- 0.4; Training=3.1 +/- 0.4; Post-training=2.1 +/- 0.4), his bouts interacting with enrichment were longer after training than before (Fig. 2). During the Pre-training phase, when the puzzle enrichment devices were being introduced and still novel, the amount of time he spent engaging with the devices showed a high level of variability. Specifically, when introduced to the sheet box for the first time on sessions 5 and 6, Odie spent an average of 470 s interacting with this device, compared to an average duration of 186 s interacting with enrichment on other days during this phase. We also observed the first item Odie interacted with (free food vs. enrichment) shifted after the Pre-training phase. Before training, Odie interacted with the enrichment device first during 87% of sessions (7 of 8 sessions) but then switched to approaching free food first during 81% of Training sessions (13 of 16 sessions) and 89% of Post-training sessions (8 of 9 sessions).

Figure 2. The duration of interaction bouts engaged with the free food pile and enrichment devices for the three experimental phases: Pre-training, Training, and Post-training.

As Odie was able to solve chambers 1-3 of the puzzle box device prior to the training, the duration of interaction bouts that included chambers 1-3 were separated from bouts that included chamber 4 for analysis. Although Odie's interaction bouts with enrichment devices were longer after training, this pattern was only evident for interaction bouts that included manipulation of the puzzle box's chamber 4 and interactions with the sheet box (Fig. 3). Furthermore, after training Odie interacted with chamber 4 for every session the puzzle box was presented (n=6), but only on 67% of sessions before training (4 of 6 sessions) and 44% of sessions during training (4 of 9 sessions).

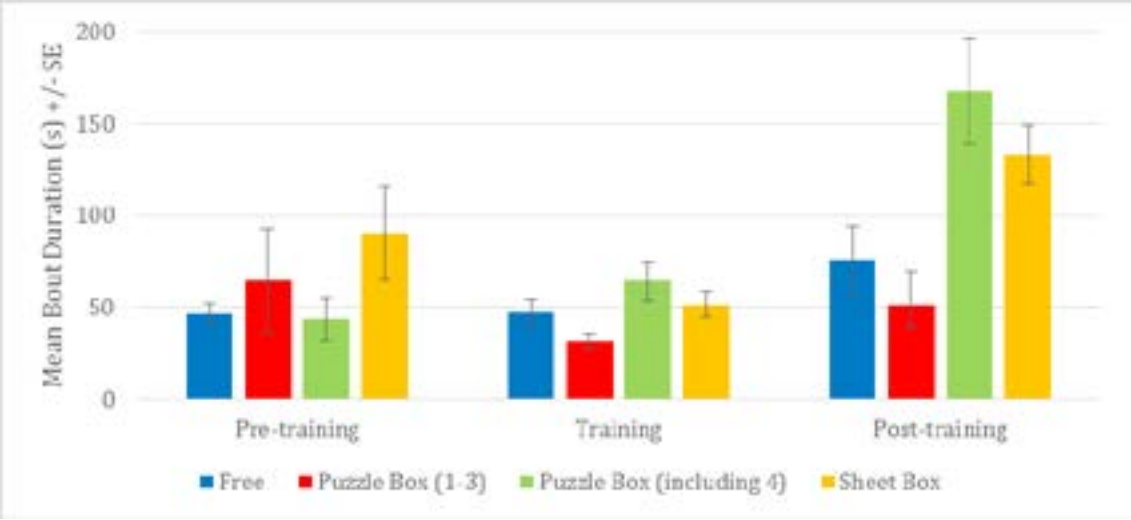

Figure 3. The duration of interaction bouts with the free food and enrichment devices. As Odie was able to acquire food from chambers 1, 2, and 3 before training, this data is shown separately from bouts that he also interacted with chamber 4.

Training, Lessons Learned

Odie is an animal that has historically been trained during formal operant conditioning training sessions. For this study he was introduced to free shaping training sessions for the first time. The training sessions were started with Odie during phase two of the study. Due to his inability to solve chamber four of the puzzle box during phase one the skill of opening a latch was the initial focus of the sessions as well as the skills needed to pull out the sheet from the sheet box. However, the most interesting lessons were taken away from the training with the latch. An easily moveable enrichment bar was created with a latch. This bar could be attached to mesh and could be moved to any location in the holding area.

From the start it was apparent that there was a difference in Odie's motivation during his formal operant conditioning sessions compared to the free shaping sessions. Although it is common practice to keep sessions positive I learned that in order to accomplish this using free shaping I needed to pay particular attention to how long his attention span lasted before he lost interest with the process. I quickly learned that 2-3 minutes was the right amount of time for him during the first sessions. The reinforcement rate also played a major role due to the fact that both trainer and animal were new to this training method. Odie needed to learn to investigate and try new things in order to gain information, and I needed to break down approximations further to provide him more information to help keep his motivation. Once both he and I became more familiar with how the sessions worked I was able to increase the overall amount of time to 3-5 minutes. It was at this time I discovered that if he lost interest during the session, taking a brief minute to positively end the session, and reset it, gave him a renewed motivation.

As sessions progressed he began to consistently go to the enrichment bar and investigate the latch. The first time he opened the latch with his nose he was bridged, reinforced heavily, and the session was ended. I was hopeful his newfound skill would easily transfer to the beginning of the next session, however, it did not. The session after he opened the latch for the first time was the next day. Although he did not perform the task of opening the latch at the onset of the session, he did open it after a few approximations were taken with him simply touching his nose to the latch. This continued for the next few sessions, but the number of approximations began decreasing and he was successful opening the latch at the start of every session.

Once Odie was able to consistently open the latch on the enrichment bar the puzzle box with chamber four was reintroduced. Unfortunately, Odie did not transfer the skill of opening the latch from the enrichment bar to the puzzle box. Due to this a few more steps were taken to help him achieve the goal of opening the latch on the puzzle box.

1. Training sessions continued with the enrichment bar being lowered in increments closer to the ground to encourage Odie to use his paws to open it instead of his nose. This was to

simulate the actual height the latch would be on the puzzle box when it was on the ground.
2. The latch from the puzzle box was replaced with the same latch that was on the enrichment bar.
3. When the puzzle box was reintroduced during training sessions it was presented on a platform that raised it up higher than it stands on its own. This was to help Odie visually recognize the latch on the puzzle box.
4. Approximations regressed during this phase and I reverted back to bridging and reinforcing for simply being close to chamber four.
5. Puzzle box was lowered to the ground once he had consistently opened the latch with the puzzle box raised.
6. Puzzle box was placed back out on exhibit.

Discussion:

The goal of this study was to explore the effects of pairing positive reinforcement training with problem solving skills to see if we could change an otters motivation to interact with complex puzzle feeders in a more goal based way, therefore increasing his contra-freeloading behavior. The overall amount of time Odie interacted with the puzzle enrichment devices, and the duration of his interaction bouts, increased after the training phase was completed. Through training and observations it was apparent that he had obtained the skills needed to solve the puzzles presented to him. Therefore his reinforcement history with the behavior of problem solving had been established, and as a result the behavior may have become a conditioned reinforcer. Although these results supported our original hypothesis, Odie's preference for going to free food before investing time in solving puzzles for food was unchanged.

During phase one of the study Odie was new to the experiment set up as well as the enrichment. His first attempts at retrieving food from the enrichment devices resulted with him using mostly brute force. He would push the devices around with his nose or paws repeatedly, and tried to push the device into the pool (note that the enrichment box weighs approx. 35lbs and was tethered to the ground so it could not be pushed into the water). When he was unsuccessful with getting food using force he would simply cease trying and leave the enrichment all together. In addition, during this phase, it was observed that as Odie became savvy with the setup, his behavior changed. When he was first exposed to the experiment set up he went to the enrichment items first which may have been due to the fact that he had clear site of the enrichment from where he entered the exhibit. He was not able to see the free food option until he moved toward the enrichment item. This may account for why, during this phase, his first interactions were higher with the enrichment item over the free food. Once he understood that the free option was always available he began to change his path so that he could go straight to the free pile first. His path went from entering the exhibit and walking in a straight line to the enrichment, to him entering the pool to swim to the other side of the land area where he could easily access the free food. Once he established this pattern he would repeat it every observation.

Before training, Odie displayed increased interaction with enrichment devices, which also corresponded to a new enrichment item (sheet box) being introduced for the first time. Throughout the study it was common for Odie to show more interest in items he had not seen in a day or two, no matter the phase. This may suggest that novelty played a role in his motivation to interact with enrichment.

During the training phase, we saw an overall decrease in the number of Odie's interactions with both the free pile and the enrichment devices. This may be due to the decrease in novelty and his recent history of failure in solving the enrichment puzzles. However, once Odie completed his training and was able to be successful solving the puzzles during training sessions he seemed to immediately transfer the behavior to the enrichment items outside of sessions.

After training, we saw a rise in his interactions with the enrichment on exhibit. We also saw a decline in his strategy to use force to push the devices around. He began solving the puzzles with success, and if he had any difficulties he stayed to complete multiple attempts, or he would leave and return a few minutes later with renewed motivation. Based on this one can deduce that his frustration level was lowered once he was taught how to successfully complete the puzzles.

Although not recorded, we anecdotally observed Odie choosing to leave the free pile of food before finishing it. He would then choose to interact with the enrichment before coming back to the free food again. In addition, when interacting with the puzzle box he left food in puzzles he had already solved and then went back to that same chamber to repeat the behavior to get more food.

When given the puzzle box during the pre-training and training phases Odie was able to solve three out of the four puzzles on his own. The most complex puzzle for Odie was chamber four. The data shows us that he had a high amount of interaction with the puzzle box during the pre-training phase, however, it is noteworthy that these interactions were mostly with the chambers he was able to successfully solve (chambers 1-3). He did show initial interest in chamber four, but when he wasn't able to complete the task of opening the latch his interactions with chamber four decreased. Once the training phase was completed his ability to open the latch was solid, and he consistently chose to interact with chamber four before going to chambers one through three. When he began going to chamber four first he was seen opening it multiple times even when the food was gone.

In conclusion, although we were not able to truly increase the contrafreeloading behavior, we did see a change in his interaction and time spent with the enrichment items. Even though this study only involved one individual this method may be useful to other captive animals in a zoological setting. We showed that by using operant conditioning we were able to teach Odie how to use the enrichment items in the intended way, which met the behavioral goals set for those particular enrichment items. By doing this we believe we decreased his level of frustration and increased his motivation to interact with the items outside of training sessions. This method can be used to help motivate animals that historically do not always interact with enrichment in the intended way. Once the animals are taught how to meet the behavioral goal of an enrichment item it will in turn help goal based enrichment programs provide successful species specific enrichment

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Aardvarks as Ambassadors

Susie Krzyzanowski

Busch Gardens Tampa

Aardvarks are a naturally reclusive animal, and are uncommon at zoos in the United States. Since most of our guests will never experience aardvarks outside our parks, the team at Busch Gardens Tampa became interested in adding them to our Animal Ambassador program. This exciting idea presented several challenges, ranging from habitat design and training protocols to developing a breeding program. The Animal Ambassador team has spent the last 8 years developing our best practices and protocols for incorporating aardvarks into an Ambassador Program, and especially raising baby aardvarks to become successful animal ambassadors.

One of the most vital roles modern zoos fulfill is connecting people with wildlife and wild places. For zoo professionals, there is hardly a better feeling than watching those connections form- right in front of you in real time, seeing people connect with an animal you care for. While there are many highlights to a zoo professional's day, some of the most satisfying are truly the moments when you walk away knowing that through your animals, you helped spark a passion to care, to conserve, and to take action.

However, today it can be more difficult than ever to foster these connections. Our guests are accustomed to moving at a rapid pace from one attention grabber to the next, frequently multitasking while they do. As a society, we have moved beyond the sound bite. The average Millennial is inundated with 140 character Tweets, 10 second Snap Chats, 5 second Vines; even the decision to date is reduced down to swiping left or right. Breaking through all the distractions can be a difficult task.

To successfully connect with our guests, we need just the right combination of passionate individuals paired with compelling species. Viewing animals in their habitats definitely helps our guests connect with them and good signage strengthens the connection. However, the very best connections are forged when guests can interact with a zoo professional and the animals they care for. It seems that with this combination, passion for wildlife and wild places is catching.

Aardvarks have a unique appeal; even amongst those who have visited Africa and experienced much of the wildlife the continent has to offer, few have opportunity to see an aardvark. Primarily active at night, they are always on the lookout for predators. Aardvarks tend to be wary creatures that disappear down a deep burrow at the first scent or sound of anything unfamiliar. Since there is little distinction between how they react to lions or humans, they are rarely seen by eco tourists. When the Animal Ambassador team at Busch Gardens in Tampa had an opportunity to add aardvark s to the collection, they embraced the opportunity. This is exactly the type of species that can foster a lasting connection between our guests and wildlife!

Although aardvark s are common in Africa, they are only on (exhibit) habitat at a handful of zoos in the United States. Perhaps this is because they pose some challenges in regards to habitat design. Because they sleep in burrows underground during the day, it is difficult to design a habitat that allows guests to see them. At night they are active and dig new tunnels, which make it impractical to landscape an aardvark habitat. They are also very likely to bury any enrichment, furniture, decoration, or themed items. This challenging combination creates an aardvark habitat that can look like an empty space comprised simply of dirt. Add in the typically shy demeanor of these animals, most facilities simply do not focus on them. However,

the Animal Ambassador team decided they were ready to take on these challenges to connect guests with aardvark s.

With these challenges in mind, in preparation for the arrival of the aardvark s, two behind the scenes habitats were constructed. The key element was the addition of a lot of clean dirt for burrowing, tunneling, and natural aardvark behavior. The side by side habitats were constructed with chain link fence; walls were built to 10 feet, with a continuous chain link floor buried under 6 feet of dirt. Each habitat has a hut large enough to accommodate two adult animals with room to spare. The habitat tops are covered with shade cloth, and tree cover provides additional shade.

In January of 2007 our aardvark s were done with quarantine, and the training began. Our male, "Frizz", was the most interactive of the pair. Our female, "Izzy", tended to be more wary of Keepers, so two goals were developed: first, develop Frizz as an ambassador since he showed a propensity for interaction. Second, build trust with Izzy to ensure she felt comfortable with keeper presence. Frizz's training was very successful, and soon the team was able to walk him on leash and harness through the park among guests. Izzy became more comfortable around the team, and was trained for tactile interactions with keepers, including voluntary ultrasounds.

The pair settled into their behind the scenes habitat and the routine; on April 10, 2011 the first baby aardvark was born. Since Izzy was a first time mom the decision was made to hand rear the baby, named "Zawadi". This was an important learning opportunity, and the team developed strategies to alleviate things like dry skin and poor stool consistency. Protocols were developed for hand rearing a baby aardvark based on these experiences. After successfully hand raising Zawadi, the team was able to implement the new protocols and once again successfully hand rear the second baby, named "Adazee", born on March 26, 2012.

In 2013 the team began to explore the option of parent raising the babies. Leaving a newborn baby aardvark with Izzy presented some risk; aardvarks are large clumsy animals, and Izzy tended to step on and bury the baby frequently. A strategy was needed to allow Izzy to raise the baby, while still ensuring its safety. If the team could monitor the mom and baby remotely, that would allow the pair to remain together, but the team could intervene if necessary.

Prior to the birth of our third aardvark baby, Kiazee, on February 5, 2013, two night vision outdoor cameras were installed in Izzy's habitat. One was installed in the den, the other outside the den to monitor all potential activity. The cameras were routed to a monitor in the barn just outside the habitats so a quick intervention was possible. For approximately a month before the birth, the team took turns staying overnight to monitor the pregnancy and to be able to watch the baby from the time of birth. After the birth, the cameras were monitored 24 hours a day, during which time staff kept detailed notes about any activity-nursing, sleeping, stimulating, digging or other activity. An isolette was set up on standby in the event that the baby needed to be separated. On the first night, it quickly became apparent that Kiazee could not stay with Izzy overnight. Izzy was simply too active, frequently stepping on her and burying her. The baby could not keep up and seemed to tire so the team took her to the isolette and offered bottles overnight. For the next 3 weeks a routine was established: Mom and baby spent the days together under the watchful eye of the team, who would monitor them the entire time they were together. Izzy would sleep, allowing the baby to nurse. Around dusk, when Izzy became active the team would weigh the baby to track growth and move her to the isolette. Supplemental bottles were offered overnight, the baby was stimulated to produce urine and fecal, and records were kept. At dawn when Izzy returned to the den to sleep for the day, Kiazee was returned to the habitat. Cool temperatures also played a role and on several occasions Kiazee was unable to be returned to the habitat until suitable temperatures were reached. Supplemental bottles were offered at regular intervals during these times.

At about 3 weeks of age, Kiazee was deemed ready to spend her first night in the habitat with Izzy. Constant supervision was maintained through the cameras and after a few overnight shifts it was clear that the pair was doing well together. Observation continued through extended late shift and early shift team hours for two more weeks, but no further intervention was necessary based on animal behavior. Cold weather again played a role, however, and there were times that Kiazee was again returned to the warmth

of a building. She was too large for an isolette and instead spent her time in the Animal Ambassador Building. Over the next few months, Kiazee continued to share a habitat with Izzy, and the team scheduled daily training sessions with her to get her ready for her role as an Animal Ambassador. Like the previous babies, she was introduced to the crate and harness early on. Also as with the previous babies, the team made sure to also introduce her to novel environments in the park- new places indoors, outdoors, different surfaces to walk on and different scents and sounds.

When the fourth aardvark "Peanut" was born on August 5, 2014 the previous plan required only a few adjustments. The cameras were upgraded for better resolution and quality and they were routed not only to a computer in the barn near the aardvark habitats, but also a DVR as well as computers in the Animal Ambassador building and the staff building. This allowed multiple team members from multiple locations the ability to monitor the baby. Additionally, both cameras were installed in the den. The camera outside the den on the habitat had proved unnecessary, while the ability to view an additional angle inside the den would be helpful. This proved to be a good choice; for the first time in park history, and aardvark birth was captured on film. The same overall process that was so successful with Kiazee was implemented with Peanut, with the same positive results. Peanut, however, refused bottles completely so although bottles were offered overnight she never took them.

By the birth of the fifth aardvark, Tazama, on September 9, 2015 the Ambassador Team and Izzy had become extremely adept at raising baby aardvarks. All the previous processes were once again followed, with only one important addition; focus shifted from raising the baby to become an ambassador to raising and also training the baby to be an ambassador.

With this shift in focus, positive reinforcement training was implemented from the very beginning, starting with her basic behaviors. Any time the baby was crated for transport to the isolette or back to the habitat she was offered a bottle. During the day, crate sessions were conducted directly outside the habitat. This allowed the team to time the session's duration based on the baby's behavior and end each session on a positive note. The baby's confidence in the crate was built up early and continuously. This would clearly be an important behavior in her future as an Ambassador.

Following is another behavior the team develops with every baby aardvark. They tend to naturally follow if a trainer walks in front of them; this is likely instinct derived from following the mother. Tazama's follow behavior was reinforced using bottles leading to a stronger behavior overall. Harness training also began while she was still taking a bottle. Additionally, any time she was in a new place or encountered new surfaces to walk on the operating principals were freedom of choice and positive reinforcement. She always had the option to return to her crate which was an established comfort zone. She became comfortable walking on dirt, grass, pine straw, artificial turf, tile, carpet, linoleum, and the pebbled guest pathways.

Since her role as an Ambassador Animal will include a lot of guest interactions, one of the team's goals was to ensure she was completely comfortable around groups of people. When she was still too small to dig up all the landscaping, her training sessions were focused in our "Guest Interaction Area". There is a barrier between the trainer with the animal and the guests. It was a great place to introduce her to all the stimuli of guest interaction, but also allow her the choice to move away. When she was in this area, she had several options: she could go into her crate, up to the barrier where the guests lined up, under the bushes, run around the open space, splash in a shallow pool, or take a bottle from a trainer. Most often she would walk all through the area, including up to the guests, and occasionally stop by her trainer for a drink from the bottle. Again, session length was dictated by her behavior and body language.

Also included in her training was developing her confidence in a range of different places. She visited our Guest Interaction Area, our front of house aardvark habitat, the Animal Ambassador building, our Education Staff Room, Human Resources offices, Administrative offices, Zoo VP and Vet staff offices, our onsite classroom, and our Corporate Offices, located about 1 ½ hours away. She was reinforced for exploring every environment available to our team, again using her behavior and body language as the determining factor in session length.

As a result of her early training some notable behavior contrasts were observed as compared with previous aardvark babies. First, she seldom vocalized. Beyond sounds baby aardvarks make when sniffing or eating, the only sound they make is a distress call. This vocalization was heard only three times, all three when she was under 2 months old. Additionally, Tazama was notably comfortable in her surroundings. While baby aardvarks might tend to try to hide or dig a tunnel and refuse a bottle, she would calmly explore whatever area she was in- sniffing, turning things over and playing, or simply lay down next to a trainer. She was also notably more comfortable in her crate than previous babies. During the weaning process the team incrementally increased the amount of time she spent in our Ambassador Building or, weather permitting, the front of house aardvark habitat. In either case, her crate was offered as an additional shelter. Tazama generally chose to use her crate as her shelter in both areas. She became so comfortable with her crate that 2 weeks before she was scheduled to make the flight to her permanent home, the team moved her shipping crate into her inside habitat. Again, she chose to use this as a shelter and the team continued offering primary reinforcement in both crates. Her high level of comfort proved to be very valuable as she made the trip from Busch Gardens in Tampa to her final home in San Diego, California.

All but one of Frizz and Izzy's offspring has moved to become ambassadors at other zoos. Adazee is currently our primary ambassador aardvark; she walks through the park daily and offers guests an up close encounter with an animal they are unlikely to meet otherwise. She has a front of house daytime habitat where rather than burrowing and hiding during the day she naps on her back, paws in the air. During the summer, she greets camp groups for encounters. She is a frequent highlight of VIP tours. These guests may be invited into her habitat to feed her, pose for a picture, and touch. She also makes appearances at park events, offering our afterhours guests a truly unique and memorable experience. In each case, Adazee delights visitors, and hopefully, this connection inspires them to conservation action.

Trimming Techniques

Karena Marrero

Natural Encounters, Inc.

Animal welfare is very important to us as keepers and trainers. Mimicking the natural environment where our exotic birds would normally live is crucial to maintaining the overall health of the animal. When housing birds in a show setting where natural elements may not always be available, other options need to be discovered. In the wild, birds would naturally wear down their nails because of the various perches and surfaces they experience. Maintaining trimmed nails is very important for the safety and health of the bird and trainer alike. In this paper, I will discuss the process of training toucans, birds of prey, cranes, and parrots to voluntarily step on to a specially made perch and have their nails trimmed.

I'd Foot That: Challenges and Successes in Enriching Birds of Prey

Jennifer Lafountain and Helena Starnes

Seaworld

In 2012, Busch Gardens Williamsburg received dispensation from the US Fish and Wildlife Service to assume responsibility for a mixed group of raptors that were serving as exhibit and ambassador animals. As various changes were made to assimilate the birds into our zoological program, one challenge stood out: enrichment. Although enrichment is a vital component of the existing animal program at Busch Gardens, it had traditionally been reserved for use with mammals and parrots. Much of the enrichment used for these animals would be unsuitable for raptors and research into how such birds are enriched at other facilities yielded limited results.

The trainers at Busch Gardens have approached this challenge by adapting existing enrichment to make it more appropriate for birds of prey, experimenting with suggestions from other facilities, and innovating new enrichment based on the natural habits of raptors. Data was collected measuring the level of engagement each animal showed with various enrichment items. This presentation will discuss the responses that were recorded and explore how different factors, such as size, species, life history, or housing arrangements, may have had an affect on the response. Based on the level of success of various enrichment types, recommendations will be made to other facilities hoping to initiate or expand a bird of prey enrichment program.

When Busch Gardens Williamsburg expanded its Bird of Prey program in 2012, the goal was to make the park a center of excellence for raptors. In our company this expansion included increasing the number of raptors at the park from only a few, to 14 as of 2016. In order to accommodate these raptors, new exhibits and habitats were built and the animal care specialists were trained on proper handling and housing techniques. Over the past 4 years, these raptors have become an integral part of the park. Today, guests that come to the park are able to get up-close encounters with these raptors through our zoological tours, show, and educational programs. For all the animals at the park, our goal is to provide the highest level of animal welfare. The animal care specialists, management, and veterinarians have devoted a great deal of time researching how to provide high standards of nutritional, medical, and behavioral needs for these raptors. But, there was one area of animal welfare that had not been tackled yet for these raptors: enrichment.

Enrichment is a well-researched tool that many zoological facilities include as a part of animal husbandry because it decreases environmental predictability, encourages and stimulates natural behaviors, and reduces undesirable behaviors. (Hosey, Melfi, and Pankhurst, 2009) In the wild, animals are constantly learning and adapting to an ever-changing environment that challenges them mentally and physically. To survive, animals must rely on innate instincts and cognitive skills. Choices are made on a daily basis that could have positive or negative consequences. In contrast, animals in a zoological setting often have very predictable surroundings and the majority of their needs are provided to them. In order to demonstrate their species-typical behaviors, there must be options in their environment to allow them to exercise control and choice. Without sensory stimulation and engaging activities, animals can develop undesirable behaviors such as: plucking, destruction of habitat, vocalizing, and aggression. Enrichment is often viewed just as critical to an animal's health as nutrition and veterinary medicine.

There is already ample research on appropriate behavioral enrichment for species known for their

playfulness and intelligence, like psittacines. At Busch Gardens Williamsburg, there was already a well-established enrichment regimen for the psittacines, mammals, and reptiles in the collection. However, when researching appropriate enrichment items for birds of prey, the results were very minimal. We already had at our disposal a large variety of enrichment types but we lacked the research on what items would be appropriate for these birds. In this study, we faced the challenge of adapting existing enrichment items and selecting new ones for our growing raptor collection.

In the wild, raptors rely on their strong talons, keen eyesight, and flight capabilities to hunt prey, defend territories, and raise their young. When capturing prey, they use their powerful talons to clamp onto prey. Their curved beak is perfect for helping them to tear and rip apart an animal. While doing so, raptors will often defend fresh kills with a behavior known as mantling. By hunching over the prey and spreading their wings and tail, it is defended from theft by other opportunistic predators. (Beebe and Webster, 2013) When choosing the enrichment items that would be used in this study, we wanted to build a variety of choices for these birds that would invoke these natural behaviors and strengths. Paper products were incorporated in several different ways in order to evoke the behaviors of ripping, shredding, and mantling. Because raptors spend a great deal of time perched in trees, we also created many perching options with a variety of substrates. One of the most notable attributes of these birds is their eyesight, so we chose enrichment items that were very visually stimulating (bright colors, food, and movement). Finally, their powerful wings allow them to chase after prey, so we found ways to elevate and hang enrichment. With a large compilation of enrichment choices at our disposal, we were ready to introduce these items to the raptors.

Bird of Prey Collection at Busch Gardens Williamsburg

Busch Gardens Williamsburg currently houses 14 birds of prey: 1.1 barn owls, 0.1 short-eared owl, 0.1 eastern screech owl, 3.2 bald eagles, 0.1 golden eagle, 1.2 Harris's hawks, and 1.0 American kestrel. Some of the raptors in this collection were rescues from the wild, while others were acquired from various zoological facilities. All of these birds were included in the study, with the exception of one barn owl that was housed in a different area at the park. A detailed list of the raptors in this study, including their life history, can be found in Appendix A.

The birds in this study are from three distinct areas in the park: shows, exhibits, and the Animal Ambassador Team. The raptors in the "Secret Life of Predators" show (0.1 Harris's hawk "Diane," 0.1 short-eared owl "Mahari," and 1.0 barn owl "Cupid) are presented and flown 3-4 times a day in an outdoor stadium in front of large audiences. This show is scripted, so there is not much variation in what we ask these birds to do daily. The birds housed on exhibit spend the majority of their time in a large habitat setting for guests viewing. There are two main raptor exhibits at the park, Eagles Ridge and the golden eagle habitat (the other birds are occasionally placed on exhibit, but it is not their primary role at the park). Eagles Ridge houses bald eagles with wing injuries (2.1 bald eagles "Penny," "Franklin," and "Abigail"), and is the only habitat in the study where multiple birds share a living space. The other exhibit houses a solitary wing injury bird (0.1 golden eagle "Aquila). The rest of our raptors are ambassadors that are trained for guest interactions, educational programs outside the park, and media appearances (1.0 American kestrel "Squire," 0.1 eastern screech owl "Pickwick," and 1.1 Harris's hawks "Tate" and "Harriet," and 1.0 bald eagle "Lincoln"). Because we travel with them, they encounter many changes in their environment daily. The only bird that did not interact with guests in any way was 0.1 bald eagle "Martha"; she was housed in a "behind the scenes" habitat during this study due to medical treatments on her feet.

Animal training is another recognized enrichment strategy. (Laule and Desmond, 1998) Much like environmental enrichment, training provides animals greater choices and control over their lives. Operant conditioning is the basis of all animal training at Busch Gardens Williamsburg. When training, we encourage natural, desirable behaviors through the exclusive use of positive reinforcement. Since over half of the raptor collection was rescued from the wild, the types of behaviors trained are based mainly on the life history of the bird and its physical capabilities. The three main ways our raptors receive primary reinforcement are from glove, flight, and perch behaviors. With the exception of the raptors housed on exhibit, all of these

birds are trained to stand on our hand or glove. Many of these sessions are done out in the park for guest interactions and shows. The flight capable raptors receive the majority of their diet during flights sessions, mainly from trainer to trainer. For the birds with permanent wing injuries (2.2 bald eagles "Franklin," "Penny," "Abigail", and "Martha" and 0.1 golden eagle "Aquila"), their training sessions focus on perching. These sessions involve trainers entering their habitat free contact and calling the birds to various perches. These sessions provide them with physical exercise and also helps build a positive animal-trainer relationship. Without this strong foundation of positive reinforcement training, this study would not have been possible.

Housing for the raptors at Busch Gardens Williamsburg is mainly in free lofted mews. The dimensions of the mew are based on the size of the raptor, and each has a large variety of perches, substrates, and stumps that are moved or changed on a regular basis. We also rotate what bird goes into each mew daily. These environmental enrichment techniques were already well established before the start of the study. The eagles housed in Eagles Ridge also have mews connected to their enclosure. This allows trainers the opportunity to do one-on-one training sessions with each bird. For the study, this also allowed us the opportunity to introduce enrichment items both individually and as a group.

The diet of the raptors at the park is largely whole prey items including: quail, fish, rabbit, chicks, mice, fuzzies, and rat. The raptors are offered all but the stomach and intestines of these items. The entire prey item is utilized including non-meaty portions like: fur, feathers, skin, and tails. Milliken meat, which is a ground meat product made specifically for carnivores, is the only non-whole prey item offered in their diet. The Milliken meat normally constitutes about 10% of their whole diet. For the bald eagles, a variety of fish (capelin, smelt, herring, trout, and butter fish) make up half of their diet. For all the raptors at the park, diets are usually cut up into bite sized pieces appropriate to the size of the raptor. This allows us to do multiple training sessions in a day with each bird. All of our raptors are carefully weight managed. The glove trained birds are weighed every day and the eagles on exhibit, which have looser weight guidelines, are weighed twice a week.

METHODS

The enrichment offered to the birds fell into several different categories based on the way in which the bird would be interacting with it: food-based items, enrichment devices, items that directly increase the bird's activity level, items that stimulate the bird mentally, environmental change, and things that provide sensory stimulation. Many enrichment items fell into multiple categories. 'Food' refers to either a food item that is not a part of the bird's normal diet, or a situation in which part of the daily diet that has been incorporated into a larger enrichment item (for example, a piece of rat inside of a kong). 'Increased activity levels' refers to interactions that elicit prolonged physical manipulation, such as tearing, shredding, or footing. 'Mental stimulation' refers to items such as puzzle feeders, where the bird is physically interacting with the enrichment but must do so in a manner that requires more thought than simply ripping the item apart in order to successfully engage it. 'Enrichment devices' are any toy-like items that the bird will be manipulating but that do not fall into the categories of physical or mental stimulation, such as kongs. 'Environmental change' refers to some sort of physical change in to the structure of the animal's living quarters. Finally, 'sensory stimulation' refers to any form of enrichment that the bird cannot physically interact with, but that creates some novel stimulation in their visual or auditory field.

Each interaction between a bird and an enrichment item was assessed, and the responses recorded for comparison. Several different factors during each enrichment session were monitored based on what we suspected might have an influence on the birds' level of engagement. We recorded the name of the animal, date, novelty of the item, category of enrichment as described above, description of enrichment item, engagement level, and relevant notes. Additional trends, such as the effect of the weather and the presence of a trainer, became apparent during the course of the study and were also included in the notes. Engagement level with the enrichment was categorized as follows:

- Aversive
- Did not acknowledge

- Showed interest in the enrichment item but did not engage
- Briefly engaged the enrichment
- Engaged the enrichment for a prolonged period of time

An aversive response was one in which the bird was purposefully avoiding or moving away from the enrichment, or showing signs of fear. "Showing interest" was defined as the bird approaching or purposefully looking at the enrichment for a brief time, but not physically interacting with it. A session with 'brief' engagement can be described as the bird investigating the enrichment but abandoning it after less than a minute. A "prolonged period of time" entailed an interaction lasting at least several minutes, in which the bird displays a behavior such as carrying the item around, mantling over it, shredding it, or perching on it.

FACTORS INFLUENCING THE LEVEL OF ENGAGEMENT

A comparison between the levels of engagement in different scenarios brought to light several different factors that seemed to have an effect on the intensity of the interaction. Factors related to the individual bird, the makeup or presentation of the enrichment, and the surrounding environment all came into play. The elements that seemed to most strongly influence the interaction were the bird's species, the pre-existing behavior of the bird, the type of behavior needed to interact with the enrichment, the inclusion of food in the enrichment item, the housing arrangements were the enrichment was received, the weather, and the material and size of the item. The age and gender of the bird did not seem to be strongly determining factors, and other factors, such as previous exposure to enrichment and the presence of the trainer, could lead to opposite effects in different situations. Due to the relatively small size of the collection, some of the trends that emerged may be due to sheer coincidence, especially when related to the individual attributes of each bird (such as age, gender, and life history).

Individual Factors

Species

There were very predictable dissimilarities in how each bird interacted with the same enrichment items. The clearest trend that emerged was the correlation between the species of the bird and the likelihood that enrichment item would be engaged. All 1.2 Harris's hawks in this study would reliably interact with the majority of the enrichment offered to them, and often for a very prolonged period of time. At the very least, they would invariably show some level of interest in a novel stimulus. It was very common for the hawks to spend several minutes footing or mantling over an enrichment item, followed by several minutes up to an hour of ripping it apart with their beaks. These birds were also likely to revisit an abandoned enrichment item later in the day.

The 1.0 barn owl, 0.1 short-eared owl, and 0.1 eastern screech owl, on the other hand, were equally predictable in their overall disinterest. It was very common for them to completely ignore novel items in their habitat. The most successful forms of enrichment for the owls in this study involved environmental changes, such as new perching and hiding options. Plants (live or fake), nest boxes, branches, and swings were the items most commonly engaged. Scenarios where food items were incorporated into the enrichment also had mixed success for the owls. Food items that were outside the realm of their normal diet, such as fish or ground meat, were generally inspected the first time they were presented, but were not eaten and were usually ignored in the future. When small portions of their diet were combined with another enrichment item (such as kongs, puzzles, and boxes), they would often interact with the enrichment. However, this interaction typically only lasted long enough to retrieve the food item, and if the food was not clearly evident and easy to retrieve, the bird would not even attempt to access it.

The 3.2 bald eagles and 0.1 golden eagle were more dynamic and varied in how they interacted with enrichment. Items that involved food were always engaged, and the eagles generally were not reluctant to spend several minutes retrieving it from puzzle feeders, boxes, bags, and other set-ups. The extent to which they interacted with enrichment that did not involve food varied a great deal from one individual to another, but it was not uncommon for them to rip it up or carry it around in their foot. Overall, their responses to

enrichment improved over time, which will be discussed later in more depth.

There was only a single falcon in our study, 1.0 American kestrel "Squire". His responses varied based on the situation, and it was very common for him to be disinterested in what was offered to him. Environmental enrichment or easily accessed food enrichment were the most successful for him. Since we had no other falcons to compare his responses with, we were unable to determine what, if any, trends in enrichment engagement can be attributed directly to his species.

Age

There are many facets of a bird's age that appear to come into play when the likelihood of interaction with enrichment is examined. Animals that were either hatched in human care or rescued while still juveniles (1.2 Harris's hawk "Tate", "Diane", and "Harriet", as well as 2.0 bald eagles "Lincoln" and "Franklin") were more likely to engage a wider range of enrichment, and for a longer period of time. There were some exceptions to this trend; 1.0 American kestrel "Squire" is an imprinted bird who was rescued as a juvenile, but showed only moderate levels of interest in enrichment, while 1.0 bald eagle "Penny", who was rescued as an adult, showed relatively high levels of engagement in comparison to the other eagles.

One difference between "Squire' and the other birds who were in human care from a very young age was the age at which enrichment was introduced. "Lincoln", "Franklin", and "Tate" all began to receive enrichment while they were still juveniles, while "Squire" was already an adult at the age of seven. Several of the other birds who showed very low interest in enrichment, such as 0.1 eastern screech owl "Pickwick" and 0.1 golden eagle "Aquila" also lived out the majority of their life expectancy before they were exposed to enrichment on a regular basis.

There was, however, no clear correlation between the present age of each bird and its level of engagement. The only instance in which age did appear to be a factor was when it led to conditions that hindered an animal's ability to see or move comfortably, such as with 0.1 golden eagle "Aquila". An adult rescue, she is at least 30 years old, has age-related cataracts, cancer, and arthritis, and had one of the lowest levels of engagement.

Sex

There was a modest correlation between the gender of each bird and the likelihood that enrichment would be interacted with. Females such as 0.1 eastern screech owl "Pickwick" and 0.1 golden eagle "Aquila" showed very low levels of engagement. The females who were more likely to engage their enrichment, such as 0.2 Harris's hawk "Harriet" and "Diane" and 0.2 bald eagles "Martha" and Abigail", were still not as likely to interact with enrichment as often or as long as their male counterparts. The absence of food involvement, in particular, would often diminish the females' interest disproportionately more than the males'.

A History of Undesirable Behaviors Emitted by the Bird

It is an unfortunate fact that wild animals in human care will sometimes develop behavioral patterns that are, for whatever reason, undesirable. Modern animal caretakers are now aware of various approaches to redirecting such behavior, and enrichment has long been established as a valuable tool in such endeavors. (Hosey et al., 2009; Maple and Perdue, 2013)

Examples of undesirable behaviors that are seen in raptors housed in human care include aggression (towards conspecifics or caretakers), excessive vocalization, bodily mutilation (such as feather plucking), and destruction of equipment (jesses, lead, and bewit) or surroundings. The birds in this study that consistently scored the highest in enrichment engagement (especially when food was not involved) were all individuals that had a history of challenging behaviors in some form or another. In contrast, the more "mellow" a bird's temperament, the less likely it was to even acknowledge that enrichment was present. The latter was the case with "Squire" and "Aquila".

The most encouraging part of this correlation was a clear decrease in the frequency of undesirable behavior as enrichment was offered more regularly. This is in line with what the zoo community now knows

about behavioral management: if an animal is not stimulated and given the means to express naturally occurring behaviors, undesirable behaviors may develop to fill that void. (Maple et al., 2013) In our study, this link was very noticeable if enrichment had to be passed over for a day due to time constraints, and the trainers later came back to an eagle with a destroyed pair of jesses or a hawk sitting in front of a pile of little feathers. For the 3.0 bald eagles and 1.2 Harris's hawks that showed this behavioral dichotomy based on the level of external stimulation, enrichment became a part of their daily husbandry as a result of this study.

Previous Exposure to Enrichment

The novelty of the enrichment item was noted to have opposing effects based on the bird's interest and the situation. The repeated presentation of an identical item to the same bird would at times decrease the level of engagement, but at other times would enhance it. The determining factor was usually the interval between presentations. If this interval was very short – for example, back to back days – the interaction on the second day would usually be briefer. However, when there were several days between the initial interaction and a later one, the later interactions were often longer and more intense than the initial one. The reason for this seemed to vary based on the individual. Individuals such as "Tate" appeared to become conditioned to have a stronger response each time the article of enrichment was presented as they began to associate that item with mantling and ripping. Other birds, such as "Franklin", would initially have an aversive response to novel items, but would become more comfortable with them after repeat presentations. Interestingly, this desensitization would usually generalize to other novel items. For example, it took several attempts before "Franklin" would interact with a whiffle ball, which was one of the first enrichment items that he was ever exposed to. However, when he was later offered different things like boxes and paper bags, he was much quicker to approach them.

For the birds whose main interaction with enrichment was to determine if it contained food (such as "Martha" and "Squire"), the novelty of an item had the opposite effect. If one of these birds had previous experience extracting the food from a puzzle toy, for example, they often retained that memory and would execute only the steps necessary to quickly retrieve the food from the enrichment. Interactions with non-novel items would usually last less than 30 seconds. However, after finding food in one enrichment item, these birds would later spend much longer interacting with novel items than they did before they started to associate food with enrichment.

Environmental Factors

Housing Arrangements

Since the nature of the Bird of Prey program at Busch Gardens Williamsburg requires that these birds often move between different housing areas and interact with our guests in a variety of different ways, the level of stimulation that they receive from their surroundings varies from day to day. The likelihood that the bird would interact with its enrichment was often influenced by where the enrichment was delivered. Typically, as the stimulation from the surroundings decreased, the bird's level of interaction with its enrichment increased. For example, if "Lincoln" received a box with paper towels in it while in his behind-the-scenes mew, he would usually spend several minutes inspecting and shredding it. In contrast, if he received an identical item in an exhibit, where he typically spent less time and was subject to more external stimulation, he would interact with the enrichment very briefly. He was also housed in the lorikeet aviary on occasion when the regular occupants were relocated over the winter – the surroundings there are even more varied and novel to "Lincoln", and when he received enrichment there he would not even acknowledge it.

Additionally, the amount of restriction on the bird's movement was found to have an effect on the way that it interacted with enrichment. There are times when the birds are tethered or kenneled due to inclement weather or in preparation for a show, and in such instances they would usually interact with enrichment more reliably and for a longer period of time. As these are also the times when the hawks and eagles were most likely to display destructive behaviors, such as chewing apart their equipment, their increased tendency to interact with enrichment at such a time was especially helpful.

There was also variability in the number of animals that occupy a given space. In order to replicate natural social groupings, the Eagle's Ridge exhibit is a space shared by multiple non-flighted Bald eagles at the same time. Two of the five bald eagles live separately; "Martha", because of an ongoing treatment she receives as a result of a hallux amputation, and "Lincoln", because the injuries that he received before he was rescued do not affect his ability to fly, so his housing requirements are different. Social grouping was correlated with a decreased duration of *time* spent with the enrichment, but not a significant decline in the likelihood that the bird would actually interact with it. As with the previous aspects of housing, this difference is most likely due to the fact that the bird's need for stimulation is already being met in some other fashion.

The most interesting way in which social grouping affected enrichment engagement was through observational learning. As mentioned earlier, "Franklin" initially had aversive responses to the enrichment that was offered to him. Various items were attempted, both on exhibit and in the attached holding area used for cleaning, medical procedures, and solitary training sessions. At best, he would ignore the enrichment, and at worst he would run away from it when it was introduced. The lightbulb finally went off in his head when identical items were placed close together on exhibit for "Franklin" and "Abigail" to receive at the same time. "Franklin" initially ignored these novel items, as usual, but was on high alert when he saw that "Abigail" had found a piece of food. The value of enrichment became clear to him when watching how "Abigail" then extracted the food from *his* enrichment as well. Although he missed out on the enrichment that time, when they were next given enrichment he was much quicker to approach it, and by mimicking how "Abigail" interacted with it, "Franklin" was finally able to successfully get the food from his enrichment. Over time he was able to interact with his enrichment without cues from "Abigail", to the extent where he would run over to interact with it more quickly and for a longer time than she would, even if food was not involved. This change in attitude also carried over to his enrichment interactions in the solitary holding area, where his aversive reactions were initially the strongest.

<u>Trainer Presence</u>

Since almost all of the birds of prey at Busch Gardens Williamsburg are glove trained, they have a relationship with the trainers that would sometimes affect how they interacted with their enrichment. Even the birds that were not glove trained still had daily interactions with the keepers through targeting, kenneling, and other trained shifting behaviors. This relationship enabled the trainer to call attention to the enrichment, or demonstrate how to operate it if the bird did not immediately approach it. Since these birds are hand fed, they are very attuned to the actions of their trainers, and have a strong association between what the trainer is doing and receiving food rewards.

The main exception to that trend was 0.1 eastern screech owl "Pickwick". Although she is comfortable being handled for guest demonstrations, while in her mew she prefers to be left to her own devices. She would usually avoid interacting with her enrichment until the trainers had departed from the area. It should be noted that she is the only bird that receives a free feed at the end of the night, instead of being hand fed by the trainer throughout the day during interactions.

There were, however, times when a *strong* relationship between the trainer and the bird could actually be what hindered the engagement of enrichment. At times the birds would anticipate that the trainer was present because a session was about to start. This strong focus on the trainer would occasionally lead them to ignore other things in their environment (such as enrichment), unless the trainer specifically pointed it out.

<u>Weather conditions and season</u>

The effect that the weather had on enrichment sessions was straight forward. If the weather created a new opportunity for the bird to express a natural behavior, then even birds that would normally interact with their enrichment might forgo the interaction in order to take advantage of the weather. For example, if "Lincoln" spotted a ray of sunshine after several consecutive days of cloudy skies, he was more likely to

go sun himself than spend a long time interacting with his enrichment. Any interaction that did occur would likely be shorter than usual, or may be delayed until his desire to sun himself had been satiated. On the other end of the spectrum, if the weather was inclement, birds housed outside were once again less likely to interact with enrichment. During heavy rain or wind, the birds would typically hunker down and wait out the storm. The presence of snow on the ground, however, did not usually detract from their enrichment interactions.

Late winter and early spring is the time of year when many birds shift gears to focus on breeding and nesting. Seasonal nesting behaviors were seen in some of the birds in our collection despite the fact that they do not have mates. These behaviors were most pronounced with 1.0 American kestrel "Squire" and 0.2 Harris's hawk "Diane" and "Harriet". During this time of year, materials that can be used for nesting became much more popular; pine straw, sticks, leaves, hay, and wool. For the remainder of the year, these items were usually not of much interest unless they were combined with other enrichment items, such as boxes or food. During springtime, this form of enrichment had to be offered carefully to "Squire"; if he had nesting materials present in his mew, he would refuse flight sessions and instead spend most of the day rearranging the substrate, vocalizing, and protecting his "nest". However, this form of enrichment did not prove to be disruptive with "Diane" and "Harriet".

Factors Relating to the Enrichment Item

Inclusion of Food Items

Even with the ideal surroundings, the birds would not acknowledge an enrichment item if it was not of interest to them. The easiest way to entice a bird was, of course, with the inclusion of food items. When the food item was something of value to the bird and clearly visible, the animal would almost always be engaged by the enrichment. For some of the animals, such as the owls and the female eagles, enrichment items that did not contain food were often ignored, or were subject to only a cursory inspection to confirm the absence of a snack. As mentioned previously, animals whose primary interest in enrichment was the food tended to have increasingly shorter interactions with their enrichment as they found the most efficient way to retrieve the food. In order to keep the bird stimulated and prolong the length of the interaction, we found it most successful to constantly change the way that the food enrichment was presented (for example, in a paper bag versus a box versus a kong), and to gradually obscure the food and/or make accessing the food more difficult. The inclusion of a food item in the enrichment was also kept to a variable schedule, so if presented with a more complex item (for example, several paper bags filled with shredded newspaper, but with food in none or only a few of the bags), the bird would often still spend several minutes interacting with it "just in case" there did end up being food somewhere.

The inclusion of food did at times actually shorten the length of time that a bird interacted with its enrichment. This was particularly true in the case of "Tate". Typically he would spend a long time enthusiastically interacting with his enrichment, but if he found that food was a part of it (for example, a quail wing in a box), he would generally take off with the piece of food, briefly mantle and devour it, and then would be done with his enrichment. It appeared that the instinct to quickly take advantage of any available food overrode his desire to interact with the enrichment.

As previously mentioned, all of the birds in this study are weight managed to keep them in an acceptable weight range. Receiving food enrichment did not have any deleterious effect on their training, as long as the amount was proportional and well-timed. For a flight trained bird, food enrichment usually totaled between 5 to 10% of the bird's diet. This enrichment was usually, but not always, factored into the bird's allotted food for the day. Food enrichment that was equivalent to less than 5% of the bird's diet or that mostly consisted of indigestible items that would be caste back up (such tails, feather, and fur) were usually considered as a "bonus" to the bird's diet; it would be noted in the bird's records that it was given, but not weighed out. Special attention was always paid to whether or not the bird consumed the food in its enrichment. If the enrichment was still untouched after a few hours, the trainer would either assist the bird in accessing it, or would replace that portion of the diet with something else during a training session. Training sessions within

the hour following the administration of food enrichment were often unsuccessful, since the bird was still full from what it just ate. Because of such, care was taken to properly time the enrichment.

Evokes natural behaviors

Even when food was not directly involved in the enrichment, some of the most successful enrichment items still relied upon instinctual behaviors that the bird would use while hunting and eating its food: visual tracking, in-flight chase, restraint with the talons, mantling, and ripping. With this process in mind, there were several different ways that an interaction with the enrichment item was able to replicate these behaviors. First, the same item could be presented in several different ways, and evoke very different responses. Items that were tossed up into the air or hanging from above often had much quicker and stronger responses than when they were left lying on the ground. Second, items that facilitated ripping, tugging, and tearing, or that can be footed or mantled over, were highly preferred. This aspect will be explored in more depth when discussing enrichment materials and relative size. Finally, when offering structural enrichment, perch preference was usually dictated by what offered the highest and broadest view.

Surprisingly, many of the birds also had good interactions with enrichment that required foraging behavior. This form of enrichment was most successful with birds that had previous experience with the inclusion of a food item in the enrichment. Knowing that it had once found food in the enrichment, the bird was much more likely to go rooting around in a bucket of hay or pine shavings in search of something edible. These interactions typically only lasted a minute or two; after the bird found what it was looking for, it had no further interest. In contrast, though, enrichment that stimulated naturally occurring behaviors (as mentioned above) would often be interacted with for 2 -3 times as long.

Relative size

The size of the enrichment item in proportion to the bird had a pivotal influence on whether the bird would acknowledge an enrichment item. When offering enrichment that was intended to be manipulated in some fashion, items that were too large to be footed or mantled over were generally ignored. For example, if 1.0 bald eagle "Lincoln' was given a tissue box with various items inside, he would immediately go over to investigate, pulling out all of the 'stuffing' and ripping it to shreds. In contrast, when given a box closer to the size of a microwave, he did not even give it a second glance. This trend held true for all of the birds, with various types of enrichment such as boxes, balls, and rope toys.

In the case of structural enrichment, such as perches and plants, larger sized items were still engaged, as long as the bird had a way to comfortably interact with it. Perch platforms and branches that were too narrow or too wide in diameter were ignored in favor of other perching options.

To a certain extent, this trend also held true with food items. The birds were not reluctant to go after food enrichment that was larger than what they were accustomed to, but items that were *smaller* than usual were sometimes ignored. This was mostly observed with the use of insects as a part of the enrichment. If crickets or mealworms were used, the kestrel and occasionally the Harris's hawks would pursue them, unless the bird's weight was higher than usual. The larger birds, such as the eagles, would often show an interest in observing the motion of the crickets, but would not try to interact with them in any way.

Material

Pliable materials were highly preferred over items that did not have any "give" to them. This included things that would bend when footed, such as rubber, leather, or thinner plastics, and things could be shredded, such as textiles and paper. Hard plastic and metal items might still be engaged, but it would be for a much briefer time. For example, "Diane" might return to foot a rubber Frisbee multiple times throughout the day, while a hard plastic Frisbee was briefly investigated, then ignored. Other "pliable" items that the birds showed a preference for included tennis balls, kongs, cotton rope toys, cardboard boxes, paper towels, newspaper, and corn cobs.

Multiple perch materials were offered, including astroturf, smooth branches (like crepe myrtle), tex-

tured branches (like pine), sisal, outdoor carpeting, and cotton. In most cases, the material of the perching did not seem to affect the bird's preference as much as the location. High perches that offered ample sunshine or a good view of something that the bird found interesting to watch, such as the food prep area, were used most often regardless of the material. Perches padded with foam beneath outdoor carpeting were offered to some of the birds that had sensitive feet, such as the eagle that was recovering from a hallux amputation. In this case, the bird would spend long amounts of time on the padded perches, and often acted reluctant to jump down.

RECOMMENDATIONS

Uses

The amount of stimulation that an animal needs in its daily life to thrive varies from individual to another. While a raptor will rarely need the same level of mental stimulation or interaction as a parrot, our observation of the animals in our care at Busch Gardens Williamsburg made it clear to us that birds of prey do have an interest in enrichment, and that at times they most certainly benefitted from it. The frequency with which we now enrich these birds is largely influenced by our findings from this study. The 1.2 Harris's hawks and 1.1 bald eagles "Lincoln" and "Martha" all receive enrichment at least once every day; the 2.1 bald eagles that are in a social grouping and the 1.0 American kestrel are often offered enrichment every day, but this is not regarded as high of importance. The 0.1 golden eagle and all of the various owls are usually offered enrichment once or twice a week, since they often show such little interest.

For a facility that is looking to introduce an enrichment schedule to their bird of prey collection, there are several factors that we would recommend taking into account when determining the frequency. Firstly, determine how stimulating the bird's environment already is (for example, is the bird tethered or free-lofted; is it solitary or in a social group; does it stay in a static exhibit or is it a glove trained bird that has a number of interactions throughout the day with the trainers and the public?). Second, carefully observe the level of stimulation that the bird seems most comfortable with, and its reaction to enrichment. Finally, consider the presence of any undesirable behaviors that could potentially be redirected to positive interactions with enrichment or behaviors occurring naturally to the species.

This final observation has proven to be the most valuable to the behavior of the birds in our collection at Busch Gardens Williamsburg. When comparing the behavior of "Lincoln" with daily enrichment versus without, the difference is very clear. Ever since he was rescued, "Lincoln" has had a history of mew aggression towards trainers entering to step him up onto the glove, as well as destructive tendencies that he took out on his jesses, lead, and telemetry. The inclusion of enrichment items that resulted in species-typical behavior, such as ripping, tearing, footing, and mantling, seemed to be the most effective in reducing instances of aggression and equipment destruction. Although the unwanted behaviors are not completely extinguished, they are now at a much lower and more manageable level with the combination of daily enrichment and frequent rotation between several different mews.

Enrichment was used in a similar fashion with 0.1 bald eagle "Martha" to redirect potentially negative responses that could have occurred towards her surroundings or trainers as a result of her on-going medical treatment. At the request of our veterinarian, "Martha," was housed in behind-the-scenes habitats that were specially designed to help her recover from hallux amputations. For safety reasons, her movement within the habitat was more restricted than the other bald eagles, and she was not able to go outside as often. To facilitate this recovery, the staff had to routinely restrain her to re-bandage her feet and apply topical treatments. Because of the negative behavioral affects these medical treatments could cause, a very strong reinforcement history from both her trainers and her surroundings was vital. Multiple training sessions throughout the day provided mental and physical stimulation, and ensured that her relationship with the staff did not deteriorate. Now, enrichment is also an essential tool used to provide her with positive, engaging surroundings.

Timing is essential when employing enrichment to negate undesirable behaviors, or the opposite effect could take place. If, for example, a bird is seen chewing on its jesses and the keeper immediately re-

sponds to that by offering the bird an enrichment item to distract it, the bird is being reinforced for chewing on its jesses. If the enrichment is sufficiently desirable, the bird may learn to chew on its jesses even more frequently in order to be offered enrichment again. It is our practice to offer enrichment as part of morning husbandry, in between training sessions, or as a reward at the end of a successful session.

Favored items

Several of the enrichment items that were offered to the raptors in our care were clearly more successful than others. A comprehensive list of all of the enrichment items that we attempted with them can be found in Appendix B. The items that we recommend most highly to other facilities fall into the categories of structural enrichment, food items, "footable" toys, and things that can be ripped apart. When introducing a new enrichment item to a raptor, we recommend monitoring how to bird interacts with it, as some of our birds were prone to eat inedible parts of the enrichment items (especially paper products). Fortunately, birds of prey do have a digestive system that is designed to expel indigestible material, and any such debris that our birds ingested was found in the caste the next day. Birds that attempted to ingest larger quantities were supervised and restricted in what they had access to. We recommend that each facility discuss this possibility with the appropriate veterinarian to get his or her opinion about the potential of harm to the bird.

Structural enrichment was especially useful for animals such as owls that are not likely to engage other forms of enrichment. The most popular examples included a rotating variety of high perches such as branches, tire swings, and stumps, hide boxes, and rotation between various housing arrangements. If there are limitations to one's ability to physically move the bird to novel locations, other visual enrichment can be offered, such as decoy owls and ducks, video clips of conspecifics doing natural behaviors, multi-colored pinwheels, and mirrors.

The food items that were best received by all species were quail wings (with the feathers intact), bison bones, and Milliken Carnivore Diet; for smaller species, crickets are also recommended. Food items are excellent candidates for using with a combination of other enrichment items. Millikin meat was especially versatile because its ground consistency made it very easy to "spread" on other items. The raptors frequently interacted with PVC pipes, small boxes, and puzzle toys that were stuffed with a food item and some sort of filler, such as paper towels. Quail wings hung by a piece of sisal twine so that a perched bird could reach it with its beak but not its feet also kept the birds engaged for a long time (and was enriching for the trainers to watch as well).

Non-food items were generally only interacted with if they could be footed or shredded. Items being offered to the bird to carry around in its foot should be of a size that the bird can easily get a firm grasp on it, and are most "interesting" when they are made of a pliable material such as rubber or leather. For our Harris's hawks, this was about 3 inches in diameter, while for the bald eagles, it was about 5 inches. Small rubber balls, whiffle balls, kongs, toilet paper tubes, and pinecones were perennial favorites. Many of those items were also good candidates for combining with food enrichment. "Shreddable" items, which were most successful when they were no more than a third of the bird's body size, include hunks of corn on the cob, hearts of romaine lettuce, boxes, stuffed animals, paper products (usually used in conjunction with some other enrichment item), and braided cotton rope toys.

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APPENDIX A: BACKGROUND OF INDIVIDUAL RAPTORS

1.0 American kestrel, "Squire"

I. Age – 7 years old
II. Area – Animal Ambassador Team
III. Background –Hit a house window in Northern Virginia when he was a juvenile. He was deemed non releasable due to imprinting. He sustained no permanent injuries.

1.1 Eastern screech owl, "Pickwick"

I. Age – Unknown (at least 7 years old)
II. Area – Animal Ambassador Team
III. Background – Was hit by a car in Northern Virginia in 2009. She was deemed non releasable due to a permanent left eye injury.

1.1 Short-eared owl, "Mahari"

I. Age – Unknown
II. Area – "Secret Life of Predators" show
III. Background – Rescued due to an injured wing. She has been in human care since 2006, and has been at the park since 2013.

1.0 American barn owl, "Cupid"

I. Age – 5 years old
II. Area- "Secret Life of Predators" show
III. Background – Hatched at another facility, and has been at the park since 2010.

1.0 Harris's hawk "Tate"

I. Age – 3 years old
II. Area – Animal Ambassador Team
III. Background – Came from a raptor breeding facility in Washington. He has been at the park since he was 6 months old.

1.1 Harris's hawk "Harriet"

I. Age – 13 years old
II. Area – Animal Ambassador Team
III. Background - Came from a raptor breeding facility, and was housed at a different zoological facility for 10 years. She has been at the park since 2013.

1.1 Harris hawk "Diane"

I. Age – 25 years old
II. Area – "Secret Life of Predators" show
III. Background – Hatched at another facility, and has been at the park since 2009.

1.0 Bald eagle "Lincoln"

I. Age – 3 years old

II. Area – Animal Ambassador Team
III. Background – Found in the wild as a juvenile with an ulcer in his left eye. He was deemed non-releasable due to blindness in the eye. He has been at the park since 2013.

1.0 Bald eagle "Franklin"
I. Age – 4-5 years old
II. Area – Eagles Ridge exhibit
III. Background – Found tangled in a barbed wire fence in Florida as a juvenile, resulting in the amputation of his right wing. He has been at the park since 2013.

1.1 Bald eagle "Abigail"
I. Age – Unknown (at least 8 years old)
II. Area – Eagles Ridge exhibit
III. Background – Found as an adult with a broken right wing in Florida. She was deemed non-releasable due to loss of flight ability. She has been at the park since 2013.

1.0 Bald eagle "Penny"
I. Age – Unknown (at least 30 years old)
II. Area – Eagles Ridge exhibit
III. Background – Illegally shot in Virginia, resulting in partial amputation of his left wing. Housed at another facility until 2010 when he came to our park.

1.1 Bald eagle "Martha"
I. Age – Unknown (at least 8 years old)
II. Area – Behind the scenes habitat for medical treatments
III. Background – Found as an adult with a broken wing in Florida. The injury resulted in a partial ring wing amputation. She also was found with lesions on her feet, resulting in the amputation of both halluxes.

1.1 Golden eagle "Aquila"
I. Age – Unknown (at least 30 years old)
II. Area – Golden Eagle exhibit
III. Background- Illegally shot by in the wild resulting in a partial amputation of her left wing. She has been at the park since 2012.

APPENDIX B: ENRICHMENT LIST

Structural Items:

- Wood stumps of various circumference (uncovered, or covered with astroturf or carpeting)
- Wood perches of various circumference (unwrapped, or wrapped with sisal, astroturf, or carpeting)
- Swinging perches
- Rope (sisal and cotton); rope swing; rope net
- Nesting box
- Bicycle tire swing
- Car tire perch
- Hanging buckets
- Bathing pools of various sizes
- Fire hose

Natural items

- Pine Straw
- Pine shavings
- Pine cone
- Hay
- Christmas trees
- Potted plants(live and artificial)
- Feathers
- Sheep wool
- Wolf fur

Paper Items:

- Paper bags of various sizes
- Paper plates
- Cardboard boxes of various sizes
- Skewers
- Twine
- Coffee filters
- Paper towels
- Newspaper
- Butcher paper
- Toilet paper tube
- Papier Mache

Food Items:

- Fish
- Rabbit fur and feet
- Millikin Carnivore Diet
- Quail wing
- Boiled egg
- Crickets and mealworms
- Bison bones
- Corn on the cob/corn husk (not meant for ingestion)
- Head of lettuce (not meant for ingestion)
- Pumpkins (not meant for ingestion)

Plastic Items:

- PVC pipe of various circumferences (with or without holes drilled in middle sections)
- Thick plastic bottles
- Whiffle balls
- Plastic rings
- Boomer balls
- Frisbees

Sensory Items:

- Bells and chimes
- Baby toy piano
- Soundtracks of various animal sounds
- Decoy duck floating in water
- Horned Owl Decoy

- Video clip of conspecifics in the wild
- Pinwheel Flower
- Mirror
- Disco ball

Toys:

- Kongs of various sizes
- Stuffed animals
- Rubber balls and tennis balls of various sizes
- Kong Wobbler Dog Toy
- Tire toy with rope
- Cotton rope toy
- Rubber bone

Puzzle toys:

- Feeder ball
- Dog Treat Maze
- Paw-zzle Balls
- Slow Feeder Dog Bowl
- Metal treat cage
- Nested puzzle feeders

Miscellaneous Items:

- Set of metal measuring cups
- Metal buckets
- Metal pans/bowls
- Mop head
- Broom head
- Sprinklers

Events

Full Day Workshop

Science, Common Sense and Compassion for Optimal Animal Training & Welfare

Thad Lacinak & Angi Millwood
Precision Behavior

Take your training up a notch! This full day workshop is designed to equip animal trainers to be the best they can be. Appropriate for novice to advanced animal keepers and trainers, participants will learn the details and strategies that can shift their training success into high gear. Although this is an advanced workshop, all concepts are explained in depth with real-world examples. The goal is to arm trainers with information and tools they can implement immediately into their daily training routines for the continued growth of the animal training field. Potential topics include:

-Clear communication: a primer for teaching any species
-Advanced reinforcement concepts that can benefit all trainers
-Frequently misunderstood ideas or strategies in animal training
-What matters the most
-Husbandry & medical training

In 2008, Thad retired from a 35-year career at Busch Entertainment Corporation as Vice President and Corporate Curator of Animal Training where he directed animal training and enrichment efforts for all U.S. SeaWorld and Busch Gardens theme parks. Thad oversaw and coordinated the efforts of over 450 animal trainers and keepers at these parks. In short, he had the world's largest animal training staff as well as the world's largest collection of trained animals under his purview. Lacinak was instrumental in developing SeaWorld's and Busch Gardens' industry-leading techniques, husbandry procedures, and spectacular killer whale shows. Thad led the team that won the prestigious THEA Award for the *Believe* killer whale show. He was key to developing the original concept for Discovery Cove and served as an integral member of the design and implementation teams. Lacinak is a member of the International Marine Animal Trainers Association where he served as Vice President and he was a founder and President of the Animal Behavior Management Alliance. In addition, he has won numerous awards for presentations and workshops at professional conferences. Since the publication of the New York Times' best-seller, *Whale Done!* in 2001, which sold over a million copies in eighteen languages, Thad continues to present keynote speeches, seminars and workshops globally to major corporations explaining the Whale Done process, vastly improving working relationships. *Whale Done Parenting* was released in the Fall of 2009. The third book in the Whale Done series, *The Whale Done School* was released in the Spring of 2012.

Previous to founding Precision Behavior, Angi held positions at several top-ranked animal facilities. She was a Manager of Marine Mammals at the Atlantis Resort in Dubai and a member of Disney's Animal

Kingdom's opening team, working with carnivores, apes and rhinos and assisting with the implementation of a variety of behavioral husbandry initiatives. She was the Animal Training Coordinator at the Fort Worth Zoo, responsible for the Zoo's animal training programs for more than 350 animal species. She was also the Director of Behavior Programs at Natural Encounters, Inc. (NEI) and earlier, worked at the Lubee Foundation, a bat conservation center. Due to her background in both animal show production and her extensive human theater experience, Angi has knowledge of storyboarding show concepts, coaching individuals for stage presence, and critiquing show production. Angi is currently a professional member of the Animal Behavior Management Alliance (ABMA), where she served for years on the Board of Directors. She is also a professional member of the International Marine Animal Trainers Association (IMATA). Angi has conducted numerous workshops for national and international zoo staff, college students and business professionals. She has served as a Course Instructor for the AZA professional courses: Animal Training Applications in Zoo and Aquarium Settings and Meeting Your Institutional Goals through Program Animals. She has presented numerous papers and workshops at professional conferences world-wide and in 2005 received the prestigious Animal Welfare Advancement Award from the ABMA. She is a graduate of Jacksonville State University with a double major in Theater and English

Icebreaker at the Florida Aquarium

Professional Development Workshop

Get your job inquiry questions ready...What do you wear to an interview? Are internships resume worthy? What is the best way to follow up after applying? What type of end of interview questions are appropriate? A panel of industry professionals answered anything delegates were ready to ask. Afterward there was time set up for resume reviews and mock interviews. There is something for everyone, whether you're just getting into the field or are interested in moving onward or upward, this workshop is for YOU!

Busch Gardens

Booksigning Event

Killing Keiko: A Cautionary Tale of One Whale

Mark A. Simmons
Executive Vice President, Ocean Embassy, Inc.
Managing Partner, OERCA

Millions *of Free Willy* movie enthusiasts have been led to believe that Keiko's return to the wild was a triumph. After the syndication of the film Blackfish, Keiko's story once again became a rallying cry for anti-zoo proponents calling for the release of other killer whales in zoological care. But according to author Mark Simmons, director of the Keiko Animal Behavior Team on the Keiko Release Project, the whale's riveting story is one of unnecessary tragedy. This lecture, *Killing Keiko: A Cautionary Tale of One Whale,* unveils the shocking evolution and collapse of the whale's rehabilitation, covering his final trek across the North Atlantic to his heart-wrenching death in Norway. Simmons discusses the most influential factors, covering theories behind the rehabilitation plan, behavioral excesses and deficits, the organizations role in the outcome and the concept of captivity and the modern zoo. In life, Keiko was undoubtedly the most famous whale in history. In death, he became the most famous case of animal abuse the world cannot yet fathom. Simmons illuminates the true story of Keiko's journey and shows why it is more important now than ever before.

Mark began his career in 1987 in marine mammal behavioral sciences, working almost exclusively with killer whales. In 1998 he formed a consulting firm, Wildlife International Network along with highly regarded marine mammal expert and close friend Robin Friday. The following April of 1999, Simmons joined the Keiko Release Project as the director of animal husbandry and led the behavior team on-site in Iceland. There he authored and applied the behavioral rehabilitation blueprint for reintroduction that gained approval from the Icelandic Ministry of Fisheries for Keiko's formal release. Simmons went on to create Ocean Embassy, whereby his team assists governments on protective marine legislation, participates in ongoing research with marine mammals and is heavily involved in the rescue and rehabilitation of sick and stranded animals. He has provided consulting on marine mammal health assessment and recovery, training program evaluation and development, and zoological program management to numerous agencies such as NOAA/NMFS and facilities worldwide in the United States, Mexico, Singapore, Bahamas, U.A.E., Philippines, Iceland, Jamaica, Panama, China and St. Lucia. Simmons also created and continues to provide visionary leadership of a large-scale research and conservation database called OERCA that serves global wildlife management needs. He has taught marine mammal behavioral science at the University of Miami and conducted numerous seminars and public lectures on the Keiko Release Project.

Tampa's Lowry Park Zoo

Awards Banquet

Honors and Awards

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".

Here and Now with Your Animal-
Techniques to Improve the Mental Awareness of Trainers and So Enable More Effective Training
František Šusta and Petra Jaškówová
www.trainingisdialogue.com

Behavioral Management Achievement Award:
Recognizes an outstanding achievement in the application of behavior management techniques.

A Challenging Past With a Promising Future: Successful Management of African Great White Pelicans Through the Use of Operant Conditioning
Tiffany Burns, Heather Statz, and Brooke Bowersox
Clearwater Marine Aquarium

Behavioral Management Innovation Award:
Recognizes outstanding application of novel, unusual or original behavior management technique.

A Key to the Misunderstood Relationship Building with an Age -Old Predator
Nelly Rivera
Theater of the Sea

Animal Welfare Advancement Award:
Recognizes achievements that enhance animal welfare through specific environmental enrichment/conditioning techniques or programs.

When Enrichment Isn't Helping: The Importance of Identifying the Function of Stereotypic Behaviors before Attempting to Modify Them
Sandy McPadden
The Buzz on Enrichment

Sharing the Knowledge Award:
Recognizes achievements in behavior management education to enhance the knowledge of professionals and/or the public to the benefit of animals in human care.

Changing a Perception: Improving Animal Welfare in Vietnam.
Erin Ivory and Georgina Allen
Wild Welfare

Poster Presentation Award:
Recognizes the best poster that represents an achievement in any of the above categories in this format.

Paw Crate Pedicures with Amur Tigers
Celess Zinda
Oregon 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.

Killing Keiko: A Cautionary Tale of One Whale
Mark Simmons
Executive Vice President, Ocean Embassy, Inc. and Managing Partner, OERCA

Post Conference Trips

Sea World Orlando

Immerse yourself in wonder at SeaWorld® Orlando. Experience awe-inspiring shows, one-of-a-kind attractions and up-close animal interactions where the aquatic world comes alive. SeaWorld Orlando® is owned by SeaWorld Parks & Entertainment™, one of the World's foremost zoological organizations and a world-wide leader in animal welfare, training, husbandry and veterinary care. The company collectively cares for one of the largest animal collections on the North American continent and has helped lead advances in the care of species in zoological facilities and in the conservation of wild populations.

Natural Encounters, Inc. Ranch

Natural Encounters, Inc. produces and presents bird shows primarily at zoos and theme parks. When not flying in shows, the birds are housed in Winter Haven, Florida at a facility known as "The Ranch". The Ranch was previously an Emu farm that was converted into their bird facility. More than 50 species are represented in the collection, including such diverse species as the Lappet-faced Vulture (*Torgos tracheliotus*), African Fish Eagle (*Haliaeetus vocifer*),Palm Cockatoo (*Probosciger aterrimus*), Hawk Headed Parrot (*Deroptyus accipitrinus*), and 2 stunning Harpy Eagles (*Harpia harpyja*). The Ranch sits on 34 acres, which allows plenty of space for housing and training free flight behaviors. In front, a large 10 acre pasture is the perfect location for lure flying falcons and conditioning other birds for shows. Breeding is also a priority with breeding enclosures for several species including Augur Buzzards (*Buteo rufofuscus*), African Fish Eagles(*Haliaeetus vocifer*), Bateleur Eagle (*Terathopius ecaudatus*), Eurasian Eagle Owl (*Bubo bubo*), African White-necked Raven (*Corvus albicollis*), Pied Crow (*Corvus albus*), Yellow-headed Vulture, and Tawny Eagles (*Aquila rapax*), which are on loan from The World Bird Sanctuary.

Member's Business Meeting

Animal Behavior Management Alliance
Annual Member Business Meeting Minutes
April 21, 2016
Tampa, Florida

I. Call to order at 12:00pm EST by Nicki Boyd, President.

II. Minutes recorded by Cinnamon Williams.

III. Opening comments by Nicki Boyd, President: This is your organization, so if you have questions or have comments on things that we can improve upon do not hesitate to speak up. Your feedback is important.

IV. Acceptance of the minutes from the 2015 member business meeting.

MOTION made by Nicki Boyd to accept the 2015 member business meeting minutes, having been reviewed in advance. Second made by Kelly Elkins. **Motion passed by unanimous consent.**

V. Board reports

A. President report: Nicki Boyd: State of Affairs of the Organizations: Doing very well financially and making good financial decisions and reinvesting into the organization. Investing into the new website and giving you professional development opportunities with Collabornation. Creating a conservation fund so that we can invest and travel scholarship on a yearly basis. Our big fund raiser is the conference so we couldn't do it without your support. Membership is doing well and getting more international memberships. We are some of our best marketing tools so going back and telling you coworkers about the conference and what ABMA has to offer and why they should join is important.

B. CFO report: Susie Ekard

i. 2015 Financial report (see attached)

MOTION *made by Susie Ekard to approve the 2015 financial report. Second made by Genevieve Warner. Discussion: Additional improvement of the financial report is part of the minutes and at this meeting does not need a second motion.*

C. Past President Margaret Rousser

i. Election results

1. Review of election process: Call for nominations in the fall from membership. If you are interested in serving on the board or committees you will want to contact Nicki in the coming year since she will be past president. This year we had 4 open positions and 4 candidates, so this year was just approving the slate of nominees. The membership approves board members and the existing board mem-

bers decide which positions are taken by each candidate.

2. Incoming board members as a result of the 2015-2016 election

These are your 4 new incoming board members: Tricia Dees, Missy Lamar, Alicia Sampson, and Clint Lusardi. So your new board will look like this: Your president will be Cathy Schlott, Past President will be Nicki Boyd, President Elect will be Tricia Dees, 1st Vice President will be Kelly Elkins, 2nd Vice President will be Missy Lamar, Susie Ekard will remain our CFO, Christa Gaus will be taking over the Secretary roll, Darren Minier will be the CIO (Chief information officer), Directors at Large: Scott Trauger, Alicia Sampson, Clint Lusardi, Justin Garner, Jay Tacey.

D. President Elect Cathy Schlott:

i. Program Council Chair introductions

1. Behavior Management Fund: Cinnamon Williams and Genevieve Warner
2. Conference: Alicia Sampson and Linda Castaneda
3. Conference Content Advisory: Christine McKnight and Emily Insalaco
4. Conference Proceedings: Jen Hickman
5. Education: Missy Lamar
6. Government Affairs: Justin Garner
7. Honors and Awards Jen Hennessey and Scott Trauger
8. Membership: Vacant
9. Merchandise: Susie Ekard
10. Nominations and Elections: Nicki Boyd
11. Public Affairs: Margaret Rousser
12. Publications: Cathy Schlott
13. Research and Evaluation: Clint Lusardi
14. Site Selection: Kelly Elkins
15. Sponsorship: Cathy Schlott
16. Website: Heather Samper

E. 1st VP: Scott Trauger

i. Thank you to all our sponsors: Tampa's Lowry Park Zoo, Busch Gardens, Florida Aquarium, Brevard Zoo, Central Florida and Botanical Gardens, Santa Fe College, Clearwater Marine Aquarium, Sea World, Natural Encounters Inc., Precision Behaviors, Animal Behavior Institute, Florida Association of Zoo and Aquariums, and Tampa Bay AAZK.

ii. Thank you to our conference hosts: Busch Gardens and Tampa's Lowry Park. Florida Aquarium for a terrific ice breaker. With planning a conference it takes over 2 ½ years to do, so thanks to everyone for their hard work.

F. 2nd VP Kelly Elkins

i. Announce 2017 conference in Cincinnati, OH

ii. Announce 2018 conference in San Antonio, TX

iii. Looking for tackers for 2019-2020.

G. Secretary: Cinnamon Williams

i. Membership update: We have 427 members in 24 countries. Argentina, Australia, Austria, Belgium, Canada, China, Czech Republic, Denmark, France, Hong Kong, Hungary, Israel, Italy, Kuwait, Mexico, Netherlands, Oman, Portugal, Singapore, South Africa, Switzerland, United Kingdom, United States, and U.S. Virgin Islands.

ii. Conference Registrants: 106 delegates that purchased weekly registration and 38 purchased daily registration. The countries representing us at this conference are Argentina, Australia, Bahamas, Canada, Denmark, Netherlands, Scotland, United Kingdom and US which is proof that we are international organization and we want to reach all of our delegates.

H. BMF Travel Scholarship Winner: Genevieve Warner Thanks to everyone who supports the raffles and silent auction this money goes to help the travel scholarship winner on a yearly basis.

I. Proceedings Committee: Jen Hickman: Thanks to all of the presenters that have already turned in papers. We have 51 presentations this year including posters. After review all of the papers they will be put in a PDF file so that we can share them with our membership. It does take a few months to get everything done. We will get them out as soon as we can.

J. Publications Committee: Cathy Schlott: If you are a member you received our new publication of Engage. This publication was requested by our membership and we need your participation with it. We would like for you to submit content for the newsletter. It doesn't have to be really wordy; it could be just quick training or enrichment that you are doing. If you have cool photos, birth announcements, new exhibits, training whatever please send it to us. engage@theabma.org. Newsletter is only awesome because you are awesome and you send us awesome stuff.

K. Conference Content Advisory Committee: Christine McKnight

i. CEU's: We were awarded 29 CEUs for IAABC, 15 for CCPDT (15 for trainers/15 for behavior consultants) and 30 for IATBC this year. A second application was submitted to IATBC for the pre-conference workshop and was awarded CEUs but I haven't received the number yet.

VI. Old Business

VII. New Business

A. Acknowledgement of outgoing board members Nicki Boyd-

All board members serve on a volunteer basis and we thank them for their time, Cinnamon Williams, Margaret Rousser and Annette Pedersen.

B. Acknowledgement of 2015-2016 (*current*) board member positions: Nicki Boyd: Some of these board members are rolling back on to the board and are changing positions. These are their current positions.

President- Nicki Boyd
President Elect- Cathy Schlott
Past President- Margaret Rousser
Secretary- Cinnamon Williams
CFO- Susie Ekard
1st Vice President- Scott Trauger
2nd Vice President- Kelly Elkins
Director- Jay Tacey
Director- Missy Lamar

Thank You
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ANIMAL BEHAVIOR INSTITUTE

A more personal education

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TAMPA BAY AAZK

BREVARD ZOO

CENTRAL FLORIDA
ZOO
& BOTANICAL GARDENS

SF
SANTA FE
COLLEGE
TEACHING ZOO

Acknowledgments

I 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 a special thank you to Gary Wilson who shares his wonderful pictures with us! It adds to character to the proceedings.

Jen Hickman

2016 Proceedings Committee members:
Ann Lablans
Christina Lavallee
Jane Anne Franklin
Peggy Hoppe
Stacie Marchionne
Dr. Susan Friedman
Jessica Robinson
Jason Jones