



The Animal Behavior Management Alliance

2015 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!

2015 ABMA Board of Directors

PRESIDENT

Nicki Boyd

PAST PRESIDENT

Margaret Rousser

PRESIDENT ELECT

Cathy Schlott

CHIEF FINANCIAL OFFICER

Susie Ekard

SECRETARY

Cinnamon Williams

SECRETARY ELECT

Christa Gaus

1ST VP

Scott Trauger

2ND VP

Kelly Elkins

CHIEF INFORMATION
OFFICER

Darren Minier

DIRECTORS AT LARGE

Annette Pederson

Jay Tacey

Missy Lamar

Justin Garner



Table of Contents

Disclaimer	2
2015 ABMA Board of Directors	3
Keynote Speakers	9
<i>Africa's Savannah Elephants in a Changing World —</i>	10
Rudi van Aarde, University of Pretoria	
<i>The Changing Face of Training in the Modern Zoo: The Welfare Connection—</i>	12
Ken Ramirez, Karen Pryor Clicker Training	
Research and Evaluation Workshop	13
<i>Promoting Good Zoo Animal Welfare, 24/7 Across Their Lifespan—</i>	14
Sabrina Brando, Animal Concepts	
Workshops	16
<i>Connecting with Our Audience!—</i>	17
Steve Martin, Natural Encounters, Inc.	
<i>Conscientiously Creating and Evaluating Motivation—</i>	23
Barbara Heidenreich, Barbara's Force Free Animal Training	
<i>What's The Motivation?—</i>	24
Steve Martin, Natural Encounters, Inc.	
<i>The Power of Relationship- Forming and Maintaining a Valuable Motivation Tool—</i>	31
Dr. Jenifer Zeligs, Animal Training and Research International	
<i>What's the Function?—</i>	32
Susan G. Friedman, Ph.D., Behavior+ Works	
Behavior Management Fund Scholarship Winner	33
<i>A Chicken's Choice: Positive Reinforcement Training Versus Free Food—</i>	34
Anaka Nazareth, Maymont Foundation	
Presentations	35
<i>It's All About the Individual—</i>	36
Valerie J Hare, The Shape of Enrichment, Inc.	
<i>When Scent Training Makes Sense: Seeing the World through a Dog's Nose—</i>	37
Anna Oblasser-Mirtl, Animal Training Center	
<i>Don't Say Don't: Moving Past "How Do I Stop My Animal From..."—</i>	38
Chris Jenkins, CPBT-KA, Natural Encounters, Inc.	
<i>Operant Conditioning in an Elder and Wounded Striped Hyena—</i>	43
Rodrigo Salas Moncada	
<i>Operant Conditioning in Bats Helps Study Their Vision—</i>	46
Clément Cechetto, Annemarie Surlykke, University of Southern Denmark	
<i>Infancy to Adulthood: The Growth, Development and Nurturing of a Behavioral Husbandry Program—</i>	47
Michelle Skurski and Katie Leighty, Disney's Animal Kingdom	
<i>Building Confidence and Curiosity - Teaching an Elephant How To Use Enrichment—</i>	49
Holger Wisbøl, Pernille Andersen, Rasmus Pedersen, Copenhagen Zoo	
<i>The Advantages and Disadvantages of Whole Carcass Feedings—</i>	51
Kirstin Anderson Hansen, University of Southern Denmark, Odense Zoo	

A Touching Experience—	52
Ashleigh Clews, National Aquarium	
Training of American Alligators in Randers Tropical Zoo —	56
Birgitte Pedersen, Randers Tropical Zoo	
Utilizing Enhanced Desensitization Techniques with a Pack Of Beagles (<i>Canis lupus familiaris</i>)—	57
Heather Samper, Mutts with Manners	
Influence of Positive Human-Animal Relationship through Positive Reinforcement Technique on Behavior and Adrenal Activity of Chinese Leopards (<i>Panthera pardus japonensis</i>) and Snow Leopards (<i>Uncia uncia</i>)—	64
Aude Bourgeois, Amandine Puaux, Juliette Roos, Muriel Kohl, Norin Chai, Muséum National d'Histoire Naturelle	
Eradicating Fear and Anxiety of Confinement, With Hamadryas Baboons—	65
Marc Alcott, Copenhagen Zoo	
Positive Reinforcement as a Replacement of the Antique Training Methods at Elephant Camps in Asia—	66
Gerardo Martinez and John Roberts, Golden Triangle Asian Elephant Foundation and Af- ricam Safari	
A Birds' Eye View- A Breakdown in Relations between Parrot and Caregiver—	69
Elaine Henley, Animal Behavior Clinic	
Seeing the World through Behavior: The Challenges of Using Operant Conditioning to Train Chinchillas to Voluntarily Participate In Educational Programs When There Are More Than 50 Animal Handlers—	74
Christina Lavalley, Zoo Atlanta	
Let's Get Physical—	78
Valerie J Hare and Mark Kingston Jones, The Shape of Enrichment, Inc.	
Decreasing Different Kinds of Aggression Using the "Stress Triangle"—	87
1) František Šusta 2) Gabrielle Harris	
1) Prague Zoo, Czech Republic 2) South African Association for Marine Biological Research, RSA	7
Training for the Unexpected: Offsite Free-Flight Programs—	97
Cathy Schlott, National Aviary	
Winged Encounters: The Kingdom Takes Flight - A Macaw Story—	101
Chris Jenkins, CPBT-KA; Arianna Bailey, CPBT-KA; Dan Blair; CPBT-KA, Natural Encounters, Inc.	
The Pros and Cons of Stress—	102
Karen Frost, Dog and Training	
The Long & Winding Road: Turning Over a New Trainer on a 6 Year Old Blind 1.0 Fossa—	105
Larissa Comb, San Diego Zoo Safari Park	
A Winning Formula: Education and Enrichment—	112
Mark Kingston Jones, The Shape of Enrichment, Inc.	
What Applied Ethology Can Contribute to Animal Behaviour Management—	113
Karolina Westlund, ILLIS Animal Behaviour Consulting	

<i>Implementing Choice and Control at the Chimpanzees in Copenhagen Zoo—</i>	118
Mikkel Famme, Copenhagen Zoo	
<i>My Taxi Ride—</i>	120
Jen Hickman, Denver Zoo	
<i>Can You See Me Now? How About Now?: A Collaborative Effort to Increase On-Exhibit Visibility of 1.1 Lions at the Oakland Zoo—</i>	126
Heather Paddock and Erica Calcagno, Oakland Zoo	
<i>Through The Lizards Eye – A Behaviourist Approach to the Diagnosis and Treatment of Behaviour Problems in Companion Lizards—</i>	127
Danielle Middleton-Beck, My Pet Guardians	
<i>Training Raptors Force Free and Without the Use of Equipment—</i>	132
Carina Soegaard Ellebaek, Ree Park Safari	
<i>An African Adventure: Raising Awareness through R+ Training Methods—</i>	133
Barbara Glatz, Animal Training Center	
<i>Using Behavior Management to Help Regulate a Diabetic Golden Lion Tamarin (Leontopithecus rosalia)—</i>	137
Jennifer Hennessey, Roger Williams Park Zoo	
<i>Good Motivation and Welfare Can Result In Good Animal Conservation: How Psychophysics Research to Determine the Effect of Anthropogenic Noise on Marine Animals—</i>	143
Kirstin Anderson Hansen ¹ , Magnus Wahlberg ¹ , Ursula Siebert ² , ¹ University of Southern Denmark, ² University of Veterinary Medicine Hannover	
Posters	144
<i>An Education Focusing on Animal Behaviour—</i>	145
Malene Friis Hansen and Pernille Bjerre, Roskilde Technical College	
<i>Behavioral Study in Weedy Seadragons (Phyllopteryx taeniolatus)—</i>	150
Susan Schodt Lynge and Cecile Gronlund Clausen, National Aquarium Denmark	
<i>Enrichment at the Elephant House—</i>	168
Holger Wisbøl, Copenhagen Zoo	
<i>The Two Faces of the Medal: Animal Training and Welfare in Ring-Tailed Lemurs (Lemur catta)—</i>	169
Barbara Regaiolli ¹ ; Consuelo Scala ² ; Caterina Spiezio ¹	
¹ Research & Conservation Department, Parco Natura Viva – Garda Zoological Park, Bussonello (VR), Italy; ² Department of Biosciences, University of Parma, Parma, Italy.	
<i>Providing New Opportunities for Hand-Reared Chimpanzees: Integration into a Social Group—</i>	173
Caterina Spiezio ¹ ; Barbara Regaiolli ¹ ; Martina Girardi ² ; D. Frasson ^{1,3} ; P. Accorsi ^{2,1} ; Research & Conservation Department, Parco Natura Viva – Garda Zoologica Park, ² Dipartimento di Scienze Mediche Veterinarie, Università degli Studi di Bologna, Italy, ³ Conservation Manager, Tacugama Chimpanzee Sanctuary	
<i>Shark Training at Kattegatcentret—</i>	176
Rune Kristiansen, Kattegatcentret, Denmark Shark Center	
Events	179
Honors and Awards	191

Member's Business Meeting	193
Sponsors	197
Acknowledgments	198



Keynote Speakers

Africa's Savannah Elephants in a Changing World

Rudi van Aarde

University of Pretoria



Indecision driven by differences of opinion and a lack of knowledge on how to protect and manage Africa's elephants is at the core of conservation conflict. In general supporters of the intrinsic value of nature wish minimal interferences, while those lobbying for economic gains for society argue in favour of extractive uses such as trade in ivory and trophy hunting. The latter often also calls for the control of elephant numbers through culling, while the former wishes conservation to rely on natural processes with minimal interference from people. At the stake of this conflict is the well-being and persistence of Africa's elephants, especially in the wake of habitat loss, political conflict, improper governance and other criminal activities and the consequences that climate change is holding for elephants.

Scientists also disagree on how to best conserve elephants and other species in a changing world. Their disagreements unfortunately play into the hands of political indecision and the consequent application of political agendas that, for instance, plague CITES and related efforts of many NGOs to contribute to the conservation of elephants and other species valued by society. Despite these disagreements elephants continue to dominate protected areas across most of sub-Saharan Africa. Here they symbolises conservation successes and failures, act as keystone species, modify and maintains savanna vegetation and related ecosystem functions, contribute to regional and local economies and come into conflict with people. Their future hinges to some extent on our abilities to cater for their needs. To do so we need to know how elephants will respond to the changing world we are living in. Our interpretation of their responses to habitat loss, conservation management interferences natural ebbs and flow of living conditions and climate change therefore make conservation sense, especially when founded in ecological principles that relates to the interactions between species and their environment. I therefore will present our findings based on some 20 years of research on free-ranging elephants across several southern African countries and use behavioural, physiological and ecological information gained through active field research to evaluate individual, population and meta-population responses to prevailing and predicted living conditions with emphasis on the influence of people, management and climate change on the future well-being of elephants.

Professor Rudi van Aarde chairs the Conservation Ecology Research Unit at the University of Pretoria and has built up an enviable reputation over the years for his contributions to zoology, the author or co-author of 185 peer-reviewed scientific papers, 12 book chapters, a plethora of technical reports and popular articles, and has presented his research findings on some 200 occasions at national or international conferences and public forums, several of these as invited speaker or guest lecturer. In South Africa he has been a forerunner in the development and promotion of conservation and restoration ecology. His impact on the above fields can be attested to by the large number of invited lectures he has been requested to present all over the globe.

His research on elephants, with emphasis on finding solutions for the causes rather than symptoms of so called 'elephant problems' commenced in 1991. This research is continuing to this day and conducted across gradients of environmental and management conditions in southern African protected areas in Mozambique, Malawi, Zambia, Botswana, Namibia and South Africa. His development of the 'megaparks for metapopulations' concept is an innovative platform for elephant conservation and places emphasis on the spatial structuring of populations and their responses to varying supplies of environmental resources.

The Changing Face of Training in the Modern Zoo: The Welfare Connection

Ken Ramirez

Karen Pryor Clicker Training

The modern zoological trainer has become increasingly aware of the benefits of training and the ways in which it assists in caring for our animals. However, that does not keep our detractors from criticizing our profession and misunderstanding our motives. Sometimes the criticism is based on misinformation, half-truths, or outdated facts. But at other times the criticism is based on real information about facilities and programs that are not adhering to best practices and modern standards. It is our responsibility as professional trainers to make sure that we represent and practice our craft properly, not because protest groups have shined a light on us, but because it the right thing to do. More importantly, we need to rally behind our professional organizations to help in bolstering and promoting information about the good work so many of us are doing in caring for our animals. We must assist facilities and programs that do not meet current best practices to move into the modern era or distance ourselves from their poor work. If we do not find the way to accomplish this we will always be measured by the lowest common denominator. This presentation will take a look at the evolution of training in the zoological field and highlight some of the common challenges and suggest some possible solutions. The goal is to focus on both perceptions and realities as well as offer some practical recommendations for how we move forward in these challenging times.

Ken Ramirez is the Executive Vice-President and Chief Training Officer of Karen Pryor Clicker Training where he helps to oversee the vision, development and implementation of training education programs for the organization. This allows Ken to help bring positive reinforcement training to all corners of the animal training world. Previously, Ken served as the Executive Vice-President of animal care and animal training at Chicago's Shedd Aquarium, where he developed and supervised animal care and animal health programs, staff training and development as well as public presentation programs for a collection of more than 32,000 animals. He worked at Shedd Aquarium for over 26 years and continues as a consultant to this day. A 35+ year veteran of animal care and training, Ramirez is a biologist and animal behaviorist who has lived in five countries and worked or consulted for zoological organizations around the world. He began his training career working with guide dogs for the visually impaired and has maintained a close affiliation to pet training throughout his career. He hosted two successful seasons of the pet training television series Talk to the Animals that compared pet training to the important work done with training and caring for animals in zoological facilities. He has also recently worked closely with several search and rescue dog organizations, service dog groups, as well as with bomb and narcotic dogs. Ramirez has been active in several professional organizations, including the International Marine Animal Trainer's Association (IMATA), of which he is a past president. Ken has written for numerous scientific publications and authored countless popular articles. He authored the book ANIMAL TRAINING: Successful Animal Management through Positive Reinforcement, published in 1999. He also teaches a graduate course on animal training at Western Illinois University.



Research and Evaluation Workshop

Promoting Good Zoo Animal Welfare, 24/7 Across Their Lifespan

Sabrina Brando

Animal Concepts

Humans are an inevitable part of the lives of all captive animals, be they zoo-housed, companion, working, laboratory or farmed animals. The goal of this interactive workshop will be to map out whether the needs and wants of the individual animals you are caring for are being met, 24/7 across the lifespan. We shall use zoo-housed animals as an example to consider the wider context. Modern zoos have many roles to fulfil; conservation, education, research and recreation are often all listed in their mission statements. These different roles can be compatible as well as conflicting, when trying to meet visitor and animal needs. Not only do zoos have roles, but zoos also apply roles to animals, which may result in different welfare considerations. Although visitors and staff only spend a number of hours at the zoo, most animals are there 24/7, all year round, from birth to death. As wild animals in captivity are reliant on humans to provide conditions to meet their needs and wants, the absence of caretakers and other zoo professionals for two-thirds of the day is likely to impact on the choices available to the animals, and their perceived control. How do we ensure high animal welfare, 24/7, throughout the animal's lifespan and in relation to the role of the animal and the wider context? The impact of the various roles for zoos and animals, the variations across the day, week, month or year, and the absence of zoo staff for the majority of the day needs to be carefully reviewed to highlight areas in need of improvements in the way animals are housed and displayed throughout their lives. In this interactive workshop, you will be given exercises to map out the provision for animals you look after from their birth to death, be they companion, laboratory, farm, working or zoo-housed animals, and to discuss practical and feasible ways improve their welfare. At the end of the workshop participants should have a clear idea of any gaps in provision of animals they care for, and have a clear direction of how to address these gaps within the constraints of their specific situation.

Sabrina Brando started her work with animals 22 years ago at the Amsterdam Zoo as a volunteer. Since then she has worked in many marine parks, zoos, research institutes, wildlife parks and in eco-tourism, with a large variety of animal species in Europe, the USA, Africa, Australia, South-America and Asia.

Since 2008 she works full-time through AnimalConcepts as a consultant in animal care, welfare and rights, working in zoos, marine parks, animal shelters, government facilities, research laboratories and wildlife sanctuaries worldwide. Species ranging from rabbits, mice and birds to bears, snakes, crocodiles, dolphins and gorillas.

Sabrina has a BSc. in psychology (cum laude) and animal behaviour. She is currently enrolled in a MSc. of Psychology and a MSc. in Animal Studies. Sabrina is involved in several research projects on animal advocacy, welfare and behaviour. She also teaches workshops on care, welfare, enrichment, exhibit design, training and behaviour, the human-animal bond, animal learning and many other animal related topics for animal care staff, veterinarians, curators, students and managers as well as working with large teams as a consultant for multiple zoos, research facilities and universities worldwide.

Sabrina teaches as a guest lecturer on the MRes in Marine Mammal Science at the St. Andrews University in Scotland and teaches on the marine mammal summer course at the Húsavík Research Center at the University of Iceland. Through the IAT UK she teaches CPD courses on animal welfare and enrichment for laboratory animals.

Sabrina has authored and co-authored peer-reviewed scientific publication as well as book chapters, presented extensively and has been an invited- and keynote speaker at animal welfare and advocacy conferences worldwide. She is a reviewer for the journals Aquatic Mammals and Animal Welfare.

Sabrina volunteers for PASA (www.pasaprimates.org), traveling to Africa to work with great ape sanctuaries and reintroduction programs, as well as other animal welfare and wildlife voluntary work worldwide. She also travels to other countries world-wide to volunteer in conservation and animal welfare programs.



Workshops

Connecting with Our Audience!

Steve Martin

Natural Encounters, Inc.

Education is a key component in the mission statement of most zoological institutions. However, many educational programs are little more than downloads of natural history information that often exceed the attention span of the audience. Even keeper talk programs conducted at exhibits often fail to engage audience members or inspire caring and conservation action as keepers recite mundane information in front of placid animals. Producing a truly affective program involves several key elements including; emotion, intrigue, anticipation, action, humor, entertainment, and conflict and resolution. Teaching animals to perform species-appropriate behaviors in exhibits is not only enriching for the animals, it provides a perfect stage for an inspirational education program. This paper will share strategies for creating truly engaging and inspirational public programs.

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

In 1984 Steve Martin began teaching animal keepers the art and science of behavior change to enhance husbandry, enrichment, and behavioral management of exhibit animals. He has now served as an animal behavior or visitor experience consultant for over 100 zoological facilities in more than 20 countries. Steve is an instructor at the AZA Animal Training School, an instructor at the Elephant Management School in Hamburg, Germany, a member of the AZA Animal Welfare Committee, and a Trustee with the World Parrot Trust. He is also President of both Natural Encounters, Inc. (NEI) a company of over 40 professional animal trainers and Natural Encounters Conservation Fund (NECF) a company dedicated to raising money for conservation programs. NECF has now raised and donated over 1.3 million dollars to in situ conservation programs around the world.

Introduction

In recent times, zoological facilities have gone from consumers of wildlife to conservers of wildlife. Mission statements of most zoological facilities reflect the move away from a purely entertainment focus and now contain statements that demonstrate a commitment to conservation, education and research. With dwindling, polluted habitats and endangered species vanishing at alarming numbers, these commitments are sorely needed at this critical time.

As zoological facilities search for ways to pursue the objectives in their mission statements they evaluate the best ways to make the connections with their audience that promote visitation and encourage behavioral changes toward better stewardship of our environment and support of the facility's conservation projects.

Zoological facilities attract more than 700 million visitors around the world. Here in the US that number is over 175 million visitors each year. Those of us who present educational programs have a tremendous opportunity and responsibility to engage, inspire and empower our audience members. One of the most effective ways to do this is through educational programming.

Show - Much more than just a four-letter word

As a show producer and consultant at many facilities around the world, I have seen a wide range of opinions about the labels we put on our programs. On one end of the spectrum are the people who hold strong opinions that calling a program a “Show” is disrespectful to the animals and conjures up visions of parrots riding scooters and chimpanzees wearing tutus and smoking cigarettes while riding bicycles. On the other end of the spectrum are the people who produce these animal spectacles and believe parrots on bicycles and chimps on bikes are great ideas. Then there are the bulk of us who fall somewhere in the middle.

To help determine what to call an educational program, I start by considering the audience. The visitors at one facility differ from the visitors to another facility when it comes to the label we use for a public program. Next, I discuss the goals for the program with our zoological partners who have contracted us. We usually discuss goals associated with increase in revenue, attendance, stay time, etc., and then move to education and conservation goals. My goals for our programs are pretty consistent from one facility to another; inspire caring and conservation action. Obviously, I cannot pursue these goals unless I have people in the seats to watch the program. Our challenge then is how to get the people in the seats.

I have a strong feeling that the title “Show” will bring more visitors to the theater than the words “Program,” “Demonstration,” or “Presentation.” I believe that for many visitors to zoological facilities the word show means action, excitement, entertainment; the very reasons people come to the facility in the first place. I would hate to lose an opportunity for someone to see my program because they chose to ride the carousel instead of attending a bird “Demonstration.”

No matter what demographic the visitor represents, one thing is true of most visitors to zoological facilities; they come to be entertained. Entertainment comes in many different forms. It doesn't have to be knee-slapping jokes or exploitive carnival tricks to be entertaining. A close-up view of a fish in a tank is entertaining to many people. A lion rising up on its hind feet at a keeper talk, a penguin darting around underwater in a pool, and a gibbon brachiating across the exhibit are all entertaining experiences for most people. In the programs we produce, we view entertainment as the vehicle for our inspirational messages and a way to extend the attention span of the audience. Without entertainment, our programs would be flat and our opportunities to deliver inspirational messages compromised by low attendance at our programs.

Defining Moments

At the AZA conference in 2007, I met Bob Chastain, the director of the Cheyenne Mountain Zoo in Colorado Springs, Colorado. We talked for a considerable amount of time about our beliefs and experiences associated with engaging our visitors. He told me about how the keepers and other employees at the Cheyenne Mountain Zoo have adopted a mission to create “Defining Moments” for visitors to the zoo. He went on to explain a defining moment as an experience that sparks an interest or otherwise may lead a person toward a caring attitude or conservation behavior. He said all of his keeper staff members are committed to creating experiences for the guests that may lead to defining moments.

The keepers at the zoo take every opportunity to involve the guests in the daily routines at the zoo, such as cleaning exhibits, feeding animals and participating in keeper talk programs. The giraffe exhibit has a walkway with a bridge that opens to allow the giraffes to walk from the holding area to the exhibit. Each morning before the giraffe are let onto the exhibit the keepers look for a youngster to come and push the button to raise the drawbridge. The look on the child's face as the giraffe pass by confirms the significance of this moment.

Susan Engfer, the previous Director of Cheyenne Mountain Zoo, had a saying that lived on after she retired from the zoo. The saying is, “Every Kid, Every Time, Goose Bumps.” All around the zoo, keepers find ways to get people to interact with animals in ways that make meaningful connections, lead to defining moments, and create goose bumps.

Habitat Theater

Keepers have talked about their animals to visitors since animals have been kept in zoos. I remember seeing keepers sharing information about animals in front of exhibits over 40 years ago and they continue on today. However, I believe the next level of the keeper talk program involves giving the animals opportunity to use their “voices” via their behavior by using senses and adaptations to “earn” a living, something we take away from them when we house them in our facilities. No matter how large, beautiful and naturalistic we build an exhibit, there are limited opportunities for animals to practice species appropriate behavior like their wild counterparts. Plus, the way most zoological facilities feed their animals decreases the motivation for animals to use the naturalistic features designed into the exhibit. With ample diets placed in convenient places at the same time by the same person each day, the life of an animal in a zoological facility becomes rather routine.

When consulting at the Singapore Zoo over 25 years ago I came upon the idea that allowing animals to use their senses and adaptations to earn a living might be a great way to enrich the lives of captive animals while at the same time provide entertaining educational opportunities. So, we taught animals in exhibits to do simple behaviors on cue for interpretation by a keeper. At first it was little more than throwing food to the animals in the exhibits, but soon we were training animals to do more difficult behaviors. Polar Bears swam under water to catch fish, lions moved to stations, gibbons brachiated through trees and arapaima fish snatched fish out of guest’s hands. After a few months we had trained animals in over 30 exhibits to participate in these enhanced keeper talk programs that we now call Habitat Theater, or Exhibit Shows.

Today we promote these exhibit shows to every zoological facility we work with. We see this program as much more than an entertainment or educational opportunities. Teaching animals to perform species-appropriate behavior gives the animals more choices and allows them to have a greater level of control over their environment. Allowing animals the ability to interact with their environment in ways that produce more positive outcomes is, in my opinion, one of the highest forms of enrichment that we can provide our animals.

Countless studies describe the value of empowering animals to use their behavior effectively, i.e., to have power of their own outcomes. In fact, based on strong evidence over decades of research, the scientific community recognizes control as a primary reinforcer, right along with the other biological/survival needs such as food, water and sex. The contra-freeloading phenomenon is one such example; it’s the tendency for animals to choose to work for food even when free food is easily obtained. Providing animals control over their environment through choice allows them to use their behavior for an effect, as nature intended; and highly enriched environments offer the most opportunity for choices. (Friedman, 2005)

Information Does Not Equal Education

I have often thought about that word “education” and wondered why people put so much emphasis on trying to educate visitors at zoological facilities. Maybe it’s because I never fully appreciated the educational experiences I had growing up, but I rarely associate the word education with anything very fun or interesting. I usually think of education as something forced on a person instead of something a person would be drawn to. But, I have to admit, when I first broke into the business my perspective about this was different than it is today.

In 1976 I produced a free-flight bird show at the San Diego Wild Animal Park. At that time I had never seen a free-flight show and I don’t know if there was even such a thing back then. So, I had nothing to model my program after. I just threw it together with the good intentions, limited knowledge, and young training skills that three other trainers and

I possessed. Our main goal was to teach people more about birds of prey so they wouldn’t shoot them. So, we hit the natural history books and loaded the program with all the facts and figures we could remember. Of course, we were all interested in this information because we were bird trainers and had an inordinate

interest in the birds. But, we soon realized our audience didn't share our attention span for this dry information. They liked the birds, but we could tell they stopped listening to the words. So, we made some changes and added more entertainment to carry our messages. It was years later that I read the following excerpt from the book *Beyond Ecophobia*, which put my thoughts into perspective.

"As adults we know the value of facts and figures, so we wish for children to know details about nature: names of trees and birds and geologic formations. Yet the names won't stick unless there's a bedding of empathy where that knowledge can take root. And in our desire to prepare the next generation of adults to deal with the legacy of our ecological assaults, there is a tendency to inform children of the problems concerning the human-nature relationship while failing to share with them its beautiful possibilities... The best teaching occurs when the emphasis is less on imparting knowledge and more on joining the child on a journey of discovery." (Sobel, 1996, p. viii).

Rather than impart knowledge, my goals are now to **inspire caring and conservation action**. What the audience members *know* about Red-tailed Hawks is less important to me than how they *feel* about Red-tailed Hawks. I have seen shows go to great lengths to describe in detail the crushing power a hawk has in its talons while never even mentioning how beneficial they are to have around. If I want people to care about hawks, I need to give them a reason; and it certainly is not because they can crush a rabbit's skull. The fact that a Red-tailed Hawk can eat over 1,000 mice in a year has the power to inspire tolerance and even create advocates in people who see hawks in their backyards or view them down the barrel of a shotgun.

Engage, Inspire, Empower

Producing affective (causing emotion or feeling) animal programs involves much more than training animals to perform exciting behaviors, narrating the action, and adding in some natural history and conservation information. Whether I am producing a full-scale show in a large amphitheater or an intimate keeper talk next to a poison dart frog exhibit, my formula for success is the same: Engage, Inspire and Empower.

I start by engaging the audience with action and entertainment. I want people smiling, leaning forward in their seats, laughing, or otherwise completely captivated by the presentation. Next, I use carefully designed dialog, or even the animal's behavior to tell stories and draw the audience into the presentation to create a personal connection with the animals. I give the people a reason to care about the animals in the show. Finally, I empower people with the tools to make a difference right now. Empowerment is what's missing in many programs I see. The presenter gets people engaged in the show, inspired by the dialog and then flatly recites, "I hope you enjoyed our presentation. Enjoy your day here at the zoo and come see us again."

In our programs we try to show people exactly how they can make a difference by doing simple things like becoming a member of the zoo, recycling, conserving what they use, and more. We also weave these messages, often subliminally, through the show, and we even have a pre-show competition where kids discover answers to questions by recycling items they find in the theater. After the show people have an opportunity to purchase gift items from the conservation booth and all of the proceeds go to our conservation efforts. Plus, we have trained ravens to sit on a large Plexiglas box with a hole in the top, take money from visitors as they leave the theater and stuff the bills in the box. At the end of the season we divide the money and share it with our zoological partners at the zoo and then distributed to in situ conservation programs. In the past 22 years we have now raised and donated over \$1 million toward helping wildlife around the world.

Show Structure

I keep certain fundamentals in mind when designing public experiences, no matter what type or size. First, the beginning and the end of the show are the two most important parts of the program. The most impressive experience should be left to the end, the grand finale. The second most impressive experience should be at the very beginning of the show. The impressive opening sets the stage for the presenta-

tion and prepares the audience for the experience. An exciting opening gives the audience a feeling of high value and anticipation for what's to come. An exciting ending sends people away with a feeling of good return on their investment, even if all they invested was their time. It also causes them to spread the word about the show and encourages repeat visitation.

A main message is a common thread or storyline that gives direction and focus to the routines. Without a main message a program can easily be swamped with gratuitous information that sinks the attention span of the audience. The main message should be broad and general in nature, like "Save our wetlands," or "Birds are cool," or "All things are connected." This main message is supported by sub messages, individual stories or points of interest that support the main message. My personal challenge is that I can never say the main message in the show. My goal is to get the visitors to perceive the essence of the message or ideally, say the main message at the end of the show. I use the behavior of the birds and sub messages to lead the audience on an exploration so that they discover the main message themselves. For an audience member to walk away from the show telling her child, "You know Billy, all things are connected" is the ultimate accomplishment for the show.

Conflict and resolution are two outstanding tools for engaging the audience and extending their attention span. Conflict comes in many forms. A ring-tailed lemur balancing precariously as it walks a rope, a chimpanzee working diligently to manipulate a food treat through a puzzle feeder, a hawk landing next to a hole where a trained rat disappeared moments earlier all stir conflicting emotions in observers. On one hand you worry for the animal but on the other you are engaged by the action and want to see the story play out to a happy resolution. We involve many conflict-resolution routines in our shows. Like a good drama TV show, we purposely create a sense of perceived danger and then let the story play out to a happy resolution.

Delivering our messages is much more than just reciting dialog. Effective use of entertainment as the vehicle for the message involves many factors. A guide that I use for structuring a program comes from an old Chinese saying: "Tell me I'll forget, show me I may remember, involve me I'll understand." The reason so many shows fail to deliver inspirational experiences is because they place too much of their energy on "telling" people a laundry list of dry facts.

In 1989 Mark Morgan and James Gramann conducted research on the attitudes and knowledge toward snakes of fifth grade students (Morgan & Gramann, 1989). They found that providing information about snakes using a 15-minute interpretive slide and tape program failed to promote positive attitudes. They also found that mere exposure to a snake in an exhibit, or terrarium, also did not increase their attitude about snakes. They found attitudes improved significantly in students who observed another person handling a snake, or better yet by the children having direct contact with the snakes.

When I design a show, I start by creating the experience without any trainers on stage. I let the action of the animals deliver the messages through vignettes supported by sound, lighting, props and other environmental manipulation. When we force ourselves to fight the urge to let dialog drive the message and design the show with the animals telling the stories through their behavior we come up with more creative and affective ways deliver the messages. As we avoid *telling* and begin *showing* the messages we get closer to creating lasting impressions. Then, we search for every opportunity to involve the audience in the show. This involvement can be direct, such as in a person holding a bird or getting a close encounter with a bird flying over their heads, or indirect, such as the vicarious experience of watching a child called up on stage to hold a bird. The final step of the design process involves adding dialog to the program to enhance the inspirational and educational experiences.

Conclusion

Meaningful experience is the key to providing education that results in changing attitudes and behavior, i.e., what people care about and what they DO. Seven hundred million people visit zoological facilities each year. How many of them leave inspired to care and contribute to conservation? Or, is the opportunity for meaningful experience more often squandered by talking heads listing dry facts and figures

about animals?

Far more meaningful than books, television, computers, or talking heads, is close encounters, defining moments, which move people, stir their hearts and hands. We change people from passive vessels to be filled with facts and move them to caring and action when we engage people with animals in more meaningful ways.

Interpretive programs, habitat theatre, shows, are a gold mine of opportunity waiting to be tapped. But to find educational gold we need to engage our audiences in what is truly engaging about animals. Programs in which animals perform species-appropriate behavior are engaging to visitors; and, the enrichment and activity benefit to the animals involved in these programs is an essential benefit, as well.

References:

Friedman, S.G., (2005). He said, she said, science says. *Good Bird Magazine*, 1(1), 10-14.

Morgan, J.M. and Gramann, J.H. 1989. Predicting effectiveness of wildlife education programs: A study of student's attitudes and knowledge towards snakes. *Wildlife Society Bulletin*, 17,501-509.

Sobel, D. 1996. *Beyond Ecophobia, Reclaiming the Heart in Nature Education*. The Orion Society, Great Barrington, MA. p. viii

Conscientiously Creating and Evaluating Motivation

Barbara Heidenreich

Barbara's Force Free Animal Training

Force free animal trainers pride themselves on empowering animal to participate, and providing desired consequences for this participation. This requires finding ways to make consequences desirable. Creating motivation can be as seemingly innocuous as withholding a preferred food item. However it can also go to the extreme of extended deprivation of food, enrichment, play, movement, social interactions, heat, cover, etc. to increase the value of access to these large items or experiences. Some methods for creating motivation lead to the question of whether the animal is seeking relief from a negative subjective state or anticipating a pleasant outcome for doing a behavior. This raises many questions about how motivation is created and what are best practices for the animal training industry. Are there optimal standard operating procedures trainers should use to create motivation? Is there a hierarchy of procedures to consider when creating motivation? How do we measure an animal's interest in the potential reinforce, and how do we measure satiation? Are we considering the ethology of the species when creating motivation or area we asking the animal to conform to meet our needs beyond what is reasonable? Can reinforced behavior influence an animal's demeanor in the presence of known reinforcers and is there a way to take that into consideration when measuring motivation? This paper will give structure, boundaries and recommendations on how to mindfully create and evaluate motivation in animal training in an effort to advance the industry and improve animal welfare.

In 1982 Barbara Heidenreich secured her first job working with animals in a veterinary hospital. After exploring different animal related jobs and receiving her degree in Zoology from UC Davis in 1990, Barbara started her career as an animal trainer in a zoological park. She has been a professional trainer ever since.

Barbara provides consulting services to zoos, nature centers and other animal facilities. She lectures regularly to the veterinary community and is an adjunct clinical instructor at Texas A&M University, Veterinary Medicine and Biological Sciences. Barbara is a former president of the International Association of Avian Trainers and Educators (www.IAATE.org) and served on the Board of Directors from 1997-2009. She volunteers her expertise to support conservation projects, The Kakapo Recovery Program and the Bird Endowment. In her career she has trained animals, trained staff, lectured and/or presented shows at over 40 facilities around the world.

Barbara has been a featured speaker on animal training in over twenty countries and has been published in nine languages. Barbara teaches learning theory as described by the science of behavior analysis. She is also passionate about teaching excellent animal training practical application skills. Barbara is thrilled to have had the opportunity to train thousands of animals, from rats to rhinos. This experience makes Barbara's expertise truly unmatched. This hands-on practice with so many different individual animals has been invaluable to helping her provide caregivers the tools they need to solve behavior problems and have a great relationship with the animals in their lives based on trust. Her goal is to leave behind a legacy of kindness to animals by sharing her expertise.

What's The Motivation?

Steve Martin

Natural Encounters, Inc.

In this presentation, the construct of motivation will be explored. A motivated animal is operationalized as one who engages in the training dialogue with quick response to discriminative stimuli. Historically, force and coercion were the tools used to motivate animals in zoological settings and even some birds performing in shows. Fortunately, those methods are being replaced with more positive approaches. But, even with the current ground swell of positive reinforcement training in the zoological field, there is much mythology and poor training practices surrounding the need to motivate animals. These include putting the blame on the animal, misrepresenting scientific principles, as well as lowering animals' weights to unacceptable levels. Fortunately, there is an emerging technology based on antecedent arrangement and positive reinforcement that allows trainers to successfully work with highly empowered animals. Key components of this technology include sensitive reading of body language, high rates of reinforcement, and clear communication of criteria. With these components, welfare is increased as animals learn to use their behavior more effectively to gain positive reinforcement.

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

In 1984 Steve Martin began teaching animal keepers the art and science of behavior change to enhance husbandry, enrichment, and behavioral management of exhibit animals. He has now served as an animal behavior or visitor experience consultant for over 100 zoological facilities in more than 20 countries. Steve is an instructor at the AZA Animal Training School, an instructor at the Elephant Management School in Hamburg, Germany, a member of the AZA Animal Welfare Committee, and a Trustee with the World Parrot Trust. He is also President of both Natural Encounters, Inc. (NEI) a company of over 40 professional animal trainers and Natural Encounters Conservation Fund (NECF) a company dedicated to raising money for conservation programs. NECF has now raised and donated over 1.3 million dollars to in situ conservation programs around the world.

Introduction

At the heart of all animal training is motivation. Motivation is created by a history of consequences, outcomes, and effects that give animals reason to behave. Creating motivation in a training environment is a skill needed by all trainers and practiced at varying levels in the zoological world. Some keepers have a myriad of tools in their training toolbox to influence motivation. Other trainers have yet to learn the vast array of motivation operations available to them and often focus only on food reinforcers in their positive reinforcement training program. But, even that is a big step forward from the historic training programs where a keeper's primary tools for motivating animals were force and coercion.

A motivating operation is something that changes the effectiveness of a consequence. When the motivating operation increases the effectiveness it is called an establishing operation and when it decreases the effectiveness it is called an abolishing operation (Chance, 2014). Nowadays, it is most common to refer to both operations with the general term, motivation operations (Langthorne and McGill, 2009). Warming a peanut may increase the effective-

ness of the reinforcer for some parrots and feeding a frozen peanut may decrease the effectiveness of the reinforcer for some parrots. Withholding food can increase motivation and feeding an abundance of food can decrease motivation. Trainers in zoological settings have recently begun to understand and quantify an extensive list of motivating operations that influence training sessions with their animals.

Of the countless motivating operations that affect the behavioral choices of the animals we train, the following are among the most significant:

Relationship

A trusting relationship between animal and trainer is an important influence on motivation. Trust is a level of certainty that interactions will result in good outcomes so interaction increases (Martin and Friedman, 2012). Trainers see varying levels of trusting behavior in animals ranging from calm body language to solicitation of tactile interactions at the approach of a trusted person. Animals that lack trust in a particular individual may show behavior ranging from uncomfortable body language like leaning away, to escape/avoidance behavior such as leaving the area. The higher the level of trust an animal has in a human, the more likely the animal is to participate in interactions with that person even in the presence of novel or ambiguous signals.

Trust levels are on a continuum specific to each animal and the conditions in which it behaves. Though we often focus on trust between animal and humans, trust is also built with various objects and situations, which is equally important to animals. Animals build trust in exhibit features, housing furniture, other animals, and even enrichment items in much a similar way that they build trust in humans. When a macaw lands on a one-inch thick branch in a tree and the branch supports its weight, the behavior is reinforced and the bird builds trust in similar sized branches it might land on in the future.

Past experiences become antecedents for future behavior. Keepers and trainers often wonder if they should be in the room with an animal they work with when there is a stressful situation such as a veterinarian immobilizing the animal. My response is almost always: “It depends. How is your trust account with that animal?” If a person has a high trust account with an animal, he or she may provide some level of comfort to the animal once it is darted, caught in a net, or otherwise put in a stressful situation. We often see animals with high trust accounts go directly to a keeper after a stressful experience and even participate in training sessions directly after being anesthetized. However, a stressful experience can completely bankrupt a keeper’s tentative trust account simply by the trainer being in the room.

One of the best ways to build trust is through a high rate of positive reinforcement. With each positive reinforcement experience we make deposits in the trust account between the trainer and animal. When a person uses aversive stimuli – negative reinforcement or punishment – to influence behavior there is often a withdrawal from the trust account. The goal should be to build the highest trust account possible through a high rate of reinforcement, to improve training relationships and performance. A high trust account can withstand the occasional withdrawals that might occur in emergency situations, routine medical procedures, or unexpected conditions.

Ability

Animals build skill and behavioral fluency through practice. Some behaviors require more effort than others and are therefore more difficult for the animals to learn and perform. As a bird develops its skills and coordination associated with a behavior, the motivation to perform the behavior increases. For instance, a parrot learning to climb a rope may be poorly motivated to perform the behavior in the beginning stages of training. However, as the bird acquires skill and coordination associated with rope-climbing, its motivation to perform the behavior will usually increase. A hawk may be poorly motivated to fly from point A to point B if a breeze is blowing from its back toward the landing spot at point B. However, through practice, a bird can learn to start the flight in a crosswind angle to gain control, and then pass the perch and circle back to land in an up-wind approach. Having learned this flight strategy, its ability to perform the behavior increases along with its motivation to make the flight in the future.

Many trainers have experienced the frustration associated with trying to teach a parrot with previously clipped wings the skill of flying from one place to another. If the bird’s wings were clipped during its first year of life, its flight attempts will have been punished by repeated crashes to the floor or running into walls or other objects, thus reducing its motivation to attempt to fly later in life. It is certainly possible for a parrot to learn to fly later in life after its wing feathers have grown in. However, it will require much more time and effort for the bird to acquire the skill than it would have if it learned to fly in its first few months of life. Additionally, teaching an older bird to fly requires a very capable trainer to lead the bird through many repetitions of small approximations to acquire the ability and confidence in the action of flying.

Learning History

Past consequences become antecedent influences on motivation for future behavior. If the consequence of landing on a gloved hand involves the same small piece of meat every flight, the motivation for a hawk to make the flight in the future may decrease. However, if a trainer offers a variety of food items in varying sizes and quantities the motivation for the bird to fly to the glove in the future should increase. A baiting strategy can also reduce motivation. When a trainer shows the food before a bird flies to the glove or enters a crate, the bird can decide if that type and quantity of food is worth the effort. As with all prompts, it is best to fade out the baiting strategy quickly in the training plan to help the animals understand criteria and consequences associated with the behavior. When baiting is necessary, the trainer should also offer food hidden in the glove or added to the crates as an additional consequence reinforce. The uncertainty of the type and quantity of food it will receive often increases a bird's motivation to fly to the glove or enter a crate.

Food reinforcers are just one of many consequences that increase behavior. What happens directly after receiving a food reinforce for flying to a trainer may also influence the motivation of the bird to fly to the person in the future. When a parrot flies to a trainer's hand and receives a nut, then gets put in a cage only to lose the opportunity to fly more or work for additional nuts, the motivation for flying to the hand in the future may decrease. Some trainers hold the jesses of a hawk that has just landed on their glove and restrict the bird's flight off the glove. No matter how reinforcing the food was to the behavior of landing on the glove, the loss of control and opportunity to leave the glove may punish future performance of the behavior of the flying to the glove. Several years ago we discontinued holding the jesses of raptors in our shows and have observed a significant increase in their motivation to fly to our gloves. If we want the bird to stay on our glove longer, we simply shape that behavior using a variable duration schedule of reinforcement. Control has been shown to be a primary reinforcer for behavior (Watson, 1967, 1972 cited in Friedman, 2014). When trainers give animals the power to leave, the animals are more likely to stay.

Environmental Influences

Training sessions occur in a variety of locations, from the relative quiet of indoor holding facilities to the noisy unpredictability of on-stage venues. No matter where the training occurs there will be opportunities for a wide variety of stimuli in the environment to interrupt training sessions and impact an animal's motivation to participate.

For social animals like macaws, a contact call can disrupt a session as a bird stops what it's doing to establish communication with conspecifics. An alarm call can send a parrot bolting from the session just as it would if it were in the wild where a predator might have just come into view. In some cases it is helpful to conduct training session in view of other animals in the group. For other animals, it might be distracting for one bird to see another during a training session. Every bird is an individual and the training environment should be adjusted according to the animal's behavior to maximize motivation.

Some trainers prefer to train in a quiet and controlled environment with few distractions. This enables the animal and trainer to increase focus on the session at hand and often creates better motivation for the animal to participate in training. However, it is possible to protect animals from distractions to the point that it actually hurts their motivation and performance in the future. What might be small distraction for most animals can be huge distraction for animals trained in tranquil settings. Quiet settings are helpful in establishing new behavior, but once an animal has learned to perform a behavior without hesitation in response to a cue the next step should be to generalize that behavior to novel environments.

Where many trainers fear the worst and will ask all human activity to stop while they are training in an amphitheater, I generally encourage activity in the training environment when an animal's behavior shows distractions will not have a major impact on motivation. If I see the animal is too distracted to focus on the training session I might try reduce distractions to increase motivation. Training in a distraction-filled environment prepares birds to deal with unforeseen events in the future.

One year we arrived at our show site at the State Fair of Texas to find a construction project adjacent to our show. The project included a huge crane that would often project over our amphitheater. The management of the fair asked if they should stop the construction during our show. Our experience with similar situations in the past caused us to believe stopping the work wouldn't happen even if we asked, so I told the president of the fair that we would deal with it. We trained birds in the amphitheater with construction crane and heavy equipment every day for the 2 weeks leading up to the show. We opened the show with birds that had well-generalized behavior to hugely distracting situations and experiences. We did the entire 24-day run of the show with construction equipment 200 feet from the stage and that amazing crane traveling over our amphitheater occasionally during the show. Though

some of the birds were nervous enough to stop their behavior as the crane moved overhead, none of the birds flew away and we never altered any shows. Had we protected the birds by stopping the construction during training sessions, our birds would have missed the important experience of generalizing their behavior to this novel environment. Plus, if a worker did happen to move the crane during our show, I am sure most of the birds would have flown off if they did not have the experience of seeing it move early in training. When chaos is the norm, animals adjust and become calm and resilient. When calm and controlled is the norm, any small distraction can cause chaos.

Clear, honest, two-way communication

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

Motivation is often diminished when trainers do the "old bait and switch," i.e., show one type or quantity of food and then provide a different type or quantity of food when the animal performs the behavior. Tricking an animal into a behavior by baiting them through a doorway and closing the door behind them, or distracting a bird with one hand so you can grab the jesses with the other are two examples of dishonest communication that lead to withdrawals from the trust account. A trainer is honest with an animal when he or she acts in ways the animals expect, given the animal's learning history with the situation.

Our primary tools for communicating with animals in a training environment are cues (discriminative stimuli, S^D) and bridging stimuli (event markers). The cue is a signal to the animal that if it performs a behavior at a specific level of criteria it will earn reinforcement. The cue is different from a command in that an animal can choose to respond to the cue with the expectation of reinforcement for correct performance; or, the animal can simply ignore the cue with no fear of aversive consequences (Friedman, 2010). The command is often associated with negative reinforcement and punishment if the animal fails to perform the desired behavior. For instance, a command for a dog to sit may be associated with pressure on the collar or pushing of the dog's rear end to force the behavior. The dog is required to perform the behavior to avoid the aversive consequence. Though animals can be motivated to respond to cues or commands, cues are the tool of choice for contemporary animal trainers committed to the most positive and least intrusive training practices.

Event Markers/Bridging Stimuli

Behavior analysts use the term "event marker" to refer to a stimulus that marks a specific level of performance of a behavior. Animal trainers more often use the term "bridging stimulus," or "bridge" for short. Both terms describe the same operation: a conditioned reinforcer that signals to an animal that it has just performed a specific behavior to criterion and should expect back-up reinforcement. This conditioned reinforcer gains its behavior increasing strength from its pairing history with a back-up reinforcer such as food, tactile contact, toys, or any other stimulus the animal will work to gain. The reinforcer has meaning "conditional" on being paired with a back-up reinforcer, either primary or secondary.

For some reason trainers around the world often thin the pairing of the bridge with the back-up reinforcer by sounding the bridging stimulus after each correct performance of a behavior but only providing a back-up reinforcer for some of the behaviors. For instance, the animal may perform three behaviors at the desired criteria and receive a bridging stimulus for each behavior but receive food only after the third behavior. This is a very common reinforcement strategy in the zoological field, and it is also one of the most confusing reinforcement strategies for the animals. Animals trained with this type of inconsistent pairing of bridge and back-up reinforcer often lose motivation to participate in the training session, exhibit a high level of incorrect response to cues, and even show frustration-induced aggression. When this happens trainers often blame the animal for the poor performance, labeling the animal as distracted, aloof, messing with their minds, obstinate, and more. By placing the blame on the animal, trainers relieve themselves of responsibility, but miss valuable information about how to increase motivation through clear communication and high rates of reinforcement.

Some trainers believe since the bridge is a reinforcer for behavior they don't have to provide a back-up reinforcer. They incorrectly call this a "variable schedule of reinforcement." However, if the bridge is truly a secondary reinforcer (as evidenced by its ability to increase or maintain behavior), the trainer is using a continuous schedule of

reinforcement. The inconsistent pairing of the bridge and back-up reinforcer can result in respondent extinction trial (i.e., delivery of the conditional stimulus without the subsequent unconditional stimulus). Just as Pavlov paired the bell ring with meat powder to elicit salivation in the dog at the sound of the bell, trainers pair the sound of a clicker or whistle to create similar reflexive behavior in animals they train. When Pavlov stopped giving meat powder after the ringing of the bell, the dogs eventually stopped salivating at the sound of the bell. Similarly, when trainers unpair the bridge and the back-up reinforcer, animals eventually stop listening to the clicker, whistle, or other audible marker, and begin to focus on the most salient information associated with impending reinforcement, which is the action of the trainer's hand moving to the reinforcer. This visual bridging stimulus often replaces the audible marker and keeps the animal in the training environment a bit longer, usually only until the low rate of back-up reinforcement reduces motivation and the animal either leaves the session, shows aggression, or the behavioral response deteriorates to the point the trainer ends the session.

Food Reinforcers

Most contemporary animal training involves the use of food items to reinforce behavior. By adjusting the amount and type of food, and method of feeding, a trainer can increase or decrease the level of motivation for the animal to participate in training. As with any reinforcer, some level of reduced access to the item is usually required to maintain its strong reinforcing properties. Between overfeeding and underfeeding is a range of the healthful provision of diet a keeper can use in various ways to create, or augment, motivation to engage in the training dialogue. Feeding the diet at different times of day may increase its reinforcing properties, e.g., delaying the training time by 2 hours might increase an animal's motivation to participate in the session. Changing the temperature, consistency, or smell of food items are just a few more of the countless motivation operations available to trainer to increase motivation of animals in training programs.

It is important to know the weight of the animal before starting a training program that includes reducing the animal's diet. Maintaining an animal at its free-feed, or ad lib, weight should be a goal for training programs, however reducing an animal's weight by no more than 10% is generally an acceptable practice in most training programs if it does not compromise the health or welfare of the animal. This is especially true when the plan is to bring the animal's weight back up as close to ad lib weight as possible.

Weighing the food they feed their animals helps trainers calculate the healthful diet for the animals and provides a range of normal weight-to-food ratio to aid them in determining an animal's health status. Losing weight while eating a consistent amount of food may be the first sign of illness for an animal. Monitoring the weight of an animal and quantifying the food it eats is one valuable tool to monitor the overall health of the animal.

Training programs that incorporate the use of weight management are incomplete without gauging the behavior of the animal being managed, as well. As training progresses and animal behavior reaches higher levels of stimulus control the animal's diet should increase over time until the animal reaches ad lib weight. Occasionally an animal's weight will increase to above ad lib and the animal will still show high motivation for training. In this case a trainer should be careful to avoid letting the animal's weight rise to unhealthy levels. Trainers should also be careful to not let an animal's weight decrease to unhealthy levels. Following the points described in this paper will help many trainers work animals at higher weights.

Secondary Reinforcers

Secondary reinforcers (AKA, conditioned or conditional reinforcers) can play an important role in motivating some animals to perform behavior. Generally speaking, secondary reinforcers are things other than food that trainers use to reinforce behavior of animals, which depend on a pairing history with other well-established reinforcers. Secondary reinforcers include things like toys, play, and companionship. Skilled trainers use a wide variety of secondary reinforcers to increase variety and motivation during training sessions.

As with primary reinforcers, secondary reinforcers generally maintain their value through some degree of reduced access, that is, a motivating operation. If a bird has a toy in its cage all day long, that particular toy may lose its value as a reinforcer. However, a toy that the animal has not seen for a day or two will likely have greater strength as a reinforcer. Additionally, a toy that a bird has never seen may frighten the bird and actually punish active behavior. A lure for a hawk, and target stick for a parrot, both have secondary reinforcing properties because of their pairing with food or other back-up reinforcers. Clicker and whistles used as bridging stimuli also have value because of their pairing with back-up reinforcers. But, it is important to note that, like confederate money, these items can lose their strength as reinforcers if they are not paired with food or other well-established reinforcers.

Secondary reinforcers are practical training tools in some environments, such as an animal's normal housing

environment, a confined and static training area, and a lab setting. When the environment is consistent and distractions are limited, animals tend to have a higher motivation for secondary reinforcers. Our birds are strong and reliable performers in their enclosures and even in setting where they have flown free for periods of time. However, once they move out of their familiar environment their motivation to return to us decreases dramatically. When animals are trained in novel environments, especially when a bird is flown free, there are a myriad of competing reinforcers tugging at the behavior of the bird that quite often out-compete with secondary reinforcers and in some cases even high value reinforcers.

When we first fly our young birds free outside many of them are on freefeed and they return to us for social reinforcers. Just being with us is reinforcing for the behavior of flying to us. However, after a few days of flying outside other elements in the environment catch the bird's attention and investigating these novel stimuli becomes more reinforcing than the social reinforcers that originally maintained the behavior of flying to us. This is when birds sit in trees exploring branches, good views, and other interesting environmental stimuli. This is also when a raptor or vulture flying nearby might easily frighten birds, and when an alarm call from a conspecific at the holding area can send the bird into a long distance flight that can be dangerous to its welfare. At this time, we begin to focus more on food as a reinforcer and shift over to a weight management program, to protect the bird from harm and to increase its performance in these more challenging conditions.

Flying birds free requires expert skills and is a very serious matter that should never be taken lightly. It is our ethical responsibility to provide for the welfare of our animals and do all we can to protect them from harm. Every time we fly a bird free we take risks. We can mitigate those risks by creating levels of motivation that increase the likelihood the bird will return safely. Creating motivation should never mean starving a bird but rather skillfully using motivating operations to increase motivation while keeping the bird's weight at healthy levels.

For birds that perform in two or three shows every day, secondary reinforcers will very likely lose their value and birds may reduce their performance in shows or may even fly away. The best approach to motivating birds' behavior is to use a combination of primary and secondary reinforcers. Just as returning to family, a favorite TV show, and a delicious meal, can add value to coming home for some people, secondary reinforcers such as puzzle feeders, toys, social interactions, etc., can add value to the behavior of returning to a holding area at a bird show. To use only secondary reinforcers with free-flight birds is potentially dangerous as it puts birds at risk of fly offs.

Conclusion

Through thoughtful antecedent and consequence arrangement, skilled trainers create motivation for animals to participate in training session. These motivating operations are as important to animal learning as husbandry and veterinary care are to animal health. Clear, honest communication and a high rate of positive reinforcement lead to trusting relationships where animals are motivated to use their behavior to earn reinforcers from trainers. With best practices that comprise contemporary training technology, animals' skills and abilities to manage their own outcomes will increase, which necessarily increases the welfare of animals in human care.

Motivation and welfare form the foundation for contemporary animal training programs. Some trainers inadvertently weaken one pillar in their attempt to strengthen the other in pursuit of their behavioral goals. Motivation and welfare should work in balance where an adjustment to one should not cause a decrease in the other. Reducing a bird's weight can increase motivation but taken too far, this will compromise welfare. Attempting to increase welfare by feeding birds a diet that keeps them at or above ad lib weight can reduce their motivation to work for food and increase their likelihood of flying off, thus compromising their welfare.

Our goal, as professional animal trainers is to find the balance, i.e., to create motivation in ways that protect and enhance an animal's welfare. Through careful use of both secondary and primary reinforcers and skillful application of motivating operations, we can motivate animals to perform in our shows while creating a more enriching and safe environment for our animals.

References

Chance, P. *Learning and Behavior*. 2014

Friedman, S.G. "Living and Learning with Animals" (Class Handout). 2014. www.behaviorworks.org

Friedman, S.G. *Contemporary Animal Training Workshop*. 2010

Langthorne, P. and McGil, P. A Tutorial on the Concept of the Motivation Operation and its Importance to Application. *Journal of Applied Behavior Analysis*. 2009

Martin, S. and Friedman, S.G., "The Power of Trust". Animal Behavior Management Alliance Conference 2012.

The Power of Relationship- Forming and Maintaining a Valuable Motivation Tool

Dr. Jenifer Zeligs

Animal Training and Research International

Classical conditioning is the process by which something that previously had one value changes by repeated predictable association with something that has a different value. The relationship formed between the animal and the trainer (or the animal and the training system) is created through the process of classical conditioning. The process of relationship development is a very complex one since it is not usually just the result of a single associative event, but the cumulative result of all of the meaningful associations between any two individuals. The motivational value of the relationship as it is perceived by the animal is of great importance and potential value to the accomplished trainer since positive relationships can provide the marginally needed extra motivation to accomplish especially difficult and challenging goals. A positive relationship can bend 'no' into 'maybe' and turn fear into acceptance. This talk will discuss in detail the process of classical conditioning and how the relationship is formed, as well as how to honestly evaluate every day choices of care and training to maximize this important motivational tool.

Jenifer A. Zeligs, Ph.D. is the owner of Animal Training and Research International which oversees a small teaching aquarium at California State University. She is the author of numerous articles and award winning presentations on animal behavior modification and its uses including her newly published book, *Animal Training 101: The complete and practical guide to the art and science of behavior modification*.

Dr. Zeligs has been working with animals since she got her start at the Smithsonian's National Zoo in Washington, D.C. while still in grade school. In that time, she has trained dozens of species of terrestrial and aquatic animals. She has also worked as a training consultant with exotic and domestic animals, as a veterinary technician, and with domestic and exotic animals trained to assist the handicapped. She has collaborated with and consulted for countless private and public facilities and organizations, and has trained animals for research, free release in the open-ocean, feature films and documentaries, public display and veterinary purposes. Dr. Zeligs has been featured in dozens of documentaries and television shows including *National Geographic Explorer*, the *Tonight Show* with Jay Leno, and *Dateline*, NBC.

Of all of her pursuits, Jenifer is most proud of her students, and finds the greatest joy in teaching and working with those passionate about their interests in conservation, animal care and training. Jenifer's students now work with and manage a wide range of animal programs throughout the world. Jenifer currently teaches at California State University, Monterey Bay and mentors students from all over the world in cutting-edge animal behavior and husbandry

What's the Function?

Susan G. Friedman, Ph.D.

Behavior+ Works

Problem behavior never occurs in a vacuum. Like all behavior, problem behavior is dependent on the conditions in which it occurs. By systematically assessing those conditions through functional assessment interviews and direct observations, we greatly increase the probability of designing and implementing successful interventions. When a problem behavior has the potential to severely reduce the quality of an animal's life, cause harm to staff, or is especially confusing, a third strategy called functional analysis provides the formal test we need to be ascertain exactly what reinforcer maintains the behavior. With these procedures, interventions can be designed that strengthen appropriate alternative behaviors and teach new skills.

Susan G. Friedman is a professor emeritus in the Department of Psychology at Utah State University. She has helped pioneer the cross-species application of behavior analysis to animals, using the same humane philosophy and scientifically sound teaching technology that has been so effective with human learners. She has written chapters in three veterinary texts, and her popular magazine articles have been translated into 13 languages (www.behaviorworks.org). She has given seminars on learning and behavior at conferences and zoos in many countries around the world. Teaching her on-line class for professionals, Living and Learning with Animals, has provided even wider dissemination of effective and humane behavior change practices.



Behavior Management Fund Scholarship Winner

A Chicken's Choice: Positive Reinforcement Training Versus Free Food

Anaka Nazareth

Maymont Foundation

As the use of positive reinforcement training (PRT) becomes popular to effectively and humanely manage animals in human care, studying its effects becomes increasingly important. Past studies have focused on measuring the behavioral and physiological responses of animals trained using PRT. However, very few studies have attempted to address the preferential response of animals towards PRT, or to examine whether, if given the choice, an animal would choose to participate in a PRT session. In this study, the degree of preference and strength of motivation that animals exhibit towards PRT was measured. Thirty-four laying hens participated in three tests: a conditioned place preference test, a choice test, and a consumer demand test. Each of these tests compared the hens' responses towards two treatments: (a) obtaining food by participating in a PRT session and (b) eating "free" food out of an easily accessible bowl. Overall, the results indicated that the hens showed no strong preference for either treatment and were equally motivated to access both a PRT session and free food. Thus, the hens did not find PRT aversive, which in combination with results from other studies with hens, suggests that PRT is effective and humane for animal husbandry and management.



Presentations

It's All About the Individual

Valerie J Hare

The Shape of Enrichment, Inc.

Environmental enrichment, as a concept, is now well recognized as an important consideration in the welfare status of any captive animal. Effective enrichment should be goal-based, aimed towards achieving one or more behavioral, biological, or logistical goals. At The Shape of Enrichment, we recommend following a systematic planning process (example available on www.enrichment.org). Enrichment strategies should be based on the animal's behavioral biology, targeting behaviors and abilities appropriate for both the species and the individuals involved. Enrichment, like welfare, is a concept that pertains to individuals, not populations. What may be enriching for one animal may not be enriching, or be highly stressful, for others. To ensure the needs of the individual are properly addressed, there are a number of attributes to be considered when designing an enrichment plan. Attributes such as personal preference; behavioral adaptations; social status; age; gender; ability; and reproductive status will be discussed and examples of enrichment strategies for each will be presented.

When Scent Training Makes Sense: Seeing the World through a Dog's Nose

Anna Oblasser-Mirtl

Animal Training Center

Some may say that dogs “see” the world through their noses, and there are many well-known ways in which people utilize the extraordinary canine sense of smell. One lesser-known application of this particular talent is as a Diabetic Alert Dog (DAD). DADs are trained to detect abnormal blood sugar levels and to alert the diabetic or another person when these levels occur. For the diabetic, as well as their family, having a DAD is a life-altering experience that greatly reduces the constant fear that accompanies Type 1 diabetes.

As in other areas of dog training, the methods used to train DADs have not always been entirely positive. At the Animal Training Center (ATC), we sought to change that by developing a program that not only fully utilizes positive reinforcement methods of training and ensures a reliable alerting behavior, but that also allows the dog to truly become a happy member of the diabetic's family. This program has been used with dogs bred and raised at the ATC, in which case training begins when the puppy is only two days old. It has also been effective, however, with dogs rescued from shelters at various ages. To date, we have successfully trained and placed 23 DADs and continue to be amazed by their abilities, such as night alerting and remote alerting. The ATC program has resulted in extraordinary partnerships that bring safety and joy to diabetics, as well as to the dogs by their sides.

Don't Say Don't: Moving Past “How Do I Stop My Animal From...”

Chris Jenkins, CPBT-KA

Natural Encounters, Inc.

“How do I stop my animal from...?”

It is a common phrase used throughout the zoo and animal training world, and one that unwittingly leads trainers to come up with punishment-based strategies in dealing with their animals' behavior challenges. Wonderful possibilities exist in modifying and replacing unwanted behaviors through positive reinforcement, but the first step for many trainers is to first change their mindset from “How do I stop my animal from...?” and instead replace this question with “What do I want them to do instead?” This paper will take a look into the challenges associated with training strategies that focus on the reduction or elimination of behaviors, and will outline an alternative strategy that instead involves identifying a specific problem behavior in observable terms, analyzing the influences in the environment that are helping to maintain it, and formulating a plan to use positive reinforcement to train the animal to do a different, incompatible behavior instead. Specific behavior problems and their resultant training strategies will be presented in detail to illustrate this process, helping to set the stage for attendees to consider for themselves how they might adjust the way in which they approach behavior challenges in order to empower them to solve these problems in a way that strengthens relationships and deals with their animals in more positive, less intrusive ways.

INTRODUCTION

Any interaction we have with an animal is training. Whether or not the word appears in your title or on your business card, any individual who works with or around animals for a living is a trainer. Whether consciously or not, we are constantly influencing the behavior of the animals in our care by the way we set up their environments, and through our own behavior. At Natural Encounters, Inc, we present engaging and entertaining live animal shows with a focus on natural behaviors, most commonly featuring free-flight birds. Additionally, we spend a great deal of time traveling around the world working as consultants at zoo, aviaries, aquariums, and other institutions to teach others about the ins and outs of operant conditioning and positive reinforcement training.

Quite commonly, one of our jobs is to help people troubleshoot situations that start with the following words: “How do I get my animal to stop...” The reduction or elimination of unwanted behaviors is a goal of many animal trainers, ranging from minor annoyances like a monkey bouncing off your head when you enter an enclosure to more serious ones such as a tiger aggressively lunging at the bars during feeding time. The trouble with this question, though, is that you can't train an animal to NOT do something. As I will discuss in a moment, whenever we look to reduce the frequency of a behavior, the science of behavior tells us that we are thinking in terms of utilizing punishment strategies. My goal today is to look at ways in which trainers can utilize alternatives to punishment that not only achieve the result of a reduction in the frequency of an unwanted behavior, but at the same time provide mental stimulation for our animals, strengthens trainers' relationships with their non-human counterparts, and give our animals a stronger voice in the way that they can participate in their own care and management.

THE SCIENCE OF BEHAVIOR

Behavioral science provides us with a clear framework for discussing behavior in a way that can be

a shared common language for animal trainers from around the world. It is important, then, to note that when I use the word “behavior” I am defining it as anything an organism does that can be seen and measured. Eye-blinking, pacing across the front of the cage, turning ones head to the right, and swinging from one tree branch to another are all behaviors. When we look at a “problem behavior”, or any behavior of interest, we strive to describe it in clear, observable terms. This allows us to talk about a behavior in unambiguous language that everyone can agree upon, which is incredibly important for troubleshooting behavioral challenges as part of a team of caretakers. If we don’t describe behaviors in this way, it is all too easy to get stuck simply telling stories that use labels that try to describe what an animal is:

“She was lazy today and didn’t want to participate.”

“He was being obstinate and just seemed frustrated when I asked him to go into his crate.”

“He’s a biter, so when the new keeper went inside the enclosure he got all fired up.”

What these descriptions lack is a clear picture of what the animal actually did. If we discipline ourselves to begin our trek towards solving problem behaviors by first defining the behavior itself in terms of what we actually see them do, we now have the ability to look at the influences in the environment that we can help manipulate in order to affect this target behavior in the future.

THE REALITIES OF REINFORCEMENT

Going back once more to behavioral science as our guide, reinforcement can be defined as the increase in the frequency of a response when the response is immediately followed by a particular consequence.¹ The best animal trainers pride themselves in utilizing positive reinforcement strategies whenever possible. From a scientific standpoint, this means a strategy of maintaining or increasing the frequency of a behavior by pairing it with the presentation of a stimulus in the environment that an animal will work to acquire (a scratch on the head, a favorite treat, a new toy, etc). When looking at a “problem behavior”, more often than not it earns that title because it occurs with some level of frequency; a problem is a problem because it keeps happening! According to behavioral science, then, this means that something is reinforcing this unwanted behavior. This will be important to keep in mind once we dig into the work of finding a new behavior to take its place.

THE PROBLEMS WITH PUNISHMENT

Just as reinforcement is at play whenever the future frequency of a behavior is increase or maintained, the opposite is true for punishment. Going back to scientific definitions, punishment is a consequence delivered after a behavior that serves to reduce the frequency or intensity with which the behavior is exhibited.² Using behavioral science as our lens, a question such as “How do I get my tiger to stop pacing?” can just as accurately be phrased as “How can I punish the behavior of pacing?” This is where things can get a bit uncomfortable for some trainers, as just the idea of willingly using punishment with their animals can ruffle their feathers. Keep in mind, though, that this is just using the scientific terminology the way that it is defined. It in no way implies that trainers who wish to eliminate or reduce the frequency of unwanted behaviors are cruel or vindictive – more likely than not they are looking only to improve the health, safety, and welfare of the animals in their care.

Here’s the reason this is important: punishment, when utilized as the backbone of a training strategy, carries with it a boatload of nasty side effects. Firstly, research has shown (with great verifiability across species lines) that punishment often leads to four very significant detrimental side effects: increased aggression, generalized fear of the environment, apathy, and escape/avoidance behavior.³ Second, it seeks to constrict the animals overall repertoire of behaviors - punishment doesn’t tell an animal what to do, and doesn’t teach a trainer how to teach. Third, and maybe worst of all... it works! Punishment wouldn’t exist if it didn’t work – it is alive and well in the world around us, and our lives as humans have been shaped by it by the people around us since birth. When punishment works, it reinforces the behavior

1 Ramirez, K., 1999

2 Friedman, S.G. and Brinker, B., 2001

3 Friedman, S.G. and Brinker, B., 2001

of the punisher, making it more likely that they'll use punishment in the future. So is the answer that there's no way for us to reduce unwanted behaviors without punishment? Far from it, and all it takes is looking at problem from a new angle.

A DIFFERENT PERSPECTIVE

What if every time we asked a question that begins with "How do I stop my animal from...?" we instead replaced it with "What do I want them to do instead?" It's a small, simple shift, but opens up a whole world of training possibilities, where you are limited only by your imagination! Going back to science as our guide, the technical term for this process is Differential Reinforcement of an Alternative behavior. It is often referred to by its acronym, "DRA." I like to refer to it as "This really awesome tool that can take your training to a whole new level!" Basically, this is the process of increasing the frequency of an alternative behavior with reinforcement while decreasing the frequency of the problem behavior with extinction (that is, withholding the reinforcers that were maintaining the problem behavior in the first place). One of the most effective forms of a DRA strategy is the Differential Reinforcement of an Incompatible behavior (DRI). Just like it sounds, it involves reinforcing an alternative behavior that is incompatible with doing the problem behavior. For example, many parrot handlers believe that getting bit by a parrot when you step them up onto your hand is just a part of working with parrots. At NEI we believe that you should never have to get bit by a parrot, so we've trained our birds to sit upright with their heads held high when they are on our hand. The behavior of sitting with their head up is incompatible with reaching down to bite us – the bird can't do both at the same time.

WHERE TO START

Behaviors, whether acceptable or problematic, never occur in a vacuum. They are always influenced by the environments in which they occur, and by the consequences that follow their performance. Going back to behavioral science, the smallest unit of behavior that can be examined is what is referred to as the A-B-C contingency:

Antecedents: anything in the environment that occurs before the performance of the behavior that "sets the stage" for its performance. Examples might include weather effects, an animal's hunger state, time of day, proximity to other animals, or the presence of novel objects in the environment, just to name a few.

Behavior: again, anything an animal does that can be seen and measured, described in clear, observable terms. "Touches the ball with her rostrum", "Lifts his left paw 6 inches off the ground", and "Bites the trainer on the back of his neck" are all clear descriptions for behaviors.

Consequences: anything that follows the behavior and is functionally related to the behavior occurring again. "Gets a food treat", "Trainer steps out of the room", and "Pushed away from the edge of the pool" are all consequences that might follow a given behavior.

The most important part of the above breakdown is in looking at how much power we have in influencing two of these three factors. In order to change behavior, we don't control the animal or the behavior itself; we make changes to the antecedent and/or consequence conditions.

When thinking about a new behavior to select to replace an undesirable behavior, there are three important things to keep in mind. First, determine the function that the problem behavior serves for the animal, then select a replacement behavior that serves the same function, but in a more appropriate way. All behavior serves a function of either gaining an animal something it wants or getting away from something it wants to avoid. Second, the replacement behavior must give the animal at least the same amount of reinforcement as the problem behavior. The animal "gets something" out of performing the problem behavior; our job is to make the replacement behavior more rewarding. Third, the replacement behavior should be one that the animal performs (or can be trained to perform) fluently, so that its high frequency will help speed along the process of extinguishing the problem behavior. An animal only has 24 hours in the day in which to perform behaviors, and the more time it can spend earning desired conse-

quences for behaviors that it can perform easily and fluently the less time it will spend performing undesirable behavior that produce no valuable consequences.

BREAK IT DOWN: ANTECEDENTS

The first thing we can influence in training a new behavior to replace an old one is to look at the ways in which we can rearrange the environment in which the undesirable behavior occurs. Behavior science terminology to the rescue!

Setting Events: can the environment be rearranged to make a better, more acceptable behavior more likely to occur than the wrong behavior?

Motivating Operations: can we up the ante and super-size the reinforcement that an animal receives for doing the new, better behavior? On the flip side, is there a way that we can drain the value of the reinforcer that's maintaining the undesirable behavior? There's actually a scientific term for this relationship known as the Matching Law: simply, given the choice between two behaviors, animals tend to choose to do the one that earns it the more reinforcement.

Cues: what is the signal in the environment that tells the animal that if it performs the problem behavior at that time that reinforcement will follow? If it can be identified, can we stop signaling it?

The bottom line is incredibly simple and incredibly powerful: make the right behavior easier to perform than the wrong behavior.

BREAK IT DOWN: CONSEQUENCES

Now that we've taken a hard look at the influences in the environment that exist before the behavior happens, we next need to look at the consequences that follow it. Behavioral science has a very simple principle known as the Law of Effect that states that behavior is a function of its consequences. The undesirable behavior has persisted because it has produced valuable consequences for the animal thus far. Is the consequence that the animal gets something it wants, or that it gets away from something it wants to avoid? When the problem behavior occurs, what is our behavioral response? Could we be doing something to inadvertently reinforce it? Is there another, more acceptable behavior that the animal can do instead in the same situation to earn the same consequence?

Take for example the behavior of a bird that bites when a trainer's hand comes in to remove it from its enclosure. The undesirable behavior is biting, and the consequence is that the hand is removed. How about this new system: the trainer's hand is presented to the parrot. If the parrot leans or moves away from the hand, then the trainer removes the hand from the cage. Both situations allow the animal to use their behavior to produce a desired outcome, but only one of them involves blood and bandages.

FIVE SIMPLE QUESTIONS

With all the above as background, really what it comes down to when looking at an unwanted behavior and how to replace it involves answering five simple questions:

1. What does the problem behavior look like; what do you actually see? (Clear, observable terms)
2. Under what conditions does the animal do the behavior? (Antecedents)
3. What does the animal get, or get away from, by performing this behavior? (Maintaining consequences)
4. Under what conditions does the animal not do the problem behavior? (Antecedents and consequences of an alternative)
5. What do you want the animal to do instead? (Pick a new behavior and start training!)

While there is no secret "one size fits all" solution to fixing problem behaviors across the board, this outline may be the closest thing that behavioral science has produced thus far. For an even more elegant, detailed step by step guide to replacing unwanted behaviors, Dr Susan Friedman, Ph.D., has put together

the Functional Assessment and Intervention Design (FAID) form on her website behaviorworks.org, which does a beautiful job in unraveling the influences and consequences of problem behaviors and planning out alternative behaviors in a very methodical, simple, and systematic way.

CONCLUSION: KEEP CALM AND TRAIN BEHAVIORS

Much of what's been discussed above is really very simple in nature when you come down to it. It's not so much about developing a new set of skills or a magic secret to deal with problem behaviors, but more about changing our perspective and looking at these challenges as opportunities to teach our animals new and valuable behaviors that earn them reinforcement and strengthen our relationships with them.

The bottom line:

- Look at the antecedent influences in the environment that are setting the stage for the problem behavior – can you eliminate or change them?
- Think about what consequences are maintaining the behavior – what happens after the behavior occurs? Is the animal getting something it wants, or getting away from something it doesn't want?
- Think about what you want the animal to do instead – put together a training plan for an alternative (preferably incompatible) behavior that you'd like the animal to do instead when in the same situation in the future.
- Get to training! Let your anxieties about past experiences, the use of labels for who an animal is, and the noise of dominance-based behavior “experts” fall away and get busy building strong new behaviors to take you and your animal confidently into the future!

NOTE: A very special thank you goes out to Dr. Susan Friedman for both her help with this presentation and for her contributions to the field of applied behavior analysis, which formed the backbone of the information presented here. Anyone interested in learning more about the science of behavior change would be very well served to read more of her work at her website, www.behaviorworks.org.

Operant Conditioning in an Elder and Wounded Striped Hyena

Rodrigo Salas Moncada

*This paper presents the case of a striped hyena (*Hyaena hyaena*) that was admitted to the veterinary hospital because of multiple health problems, therefore we needed to apply medical treatment several times per day. We developed a training program that allowed us to teach different medical routines without any physical restraint, and because they are dangerous and unpredictable, we decided to do it by protected contact.*

The chronic health problems that the hyena presented sadly produced the necessity of isolation for long periods of time, limiting its options for behavioral development. Operant conditioning as a basic tool for management of captive animals and for offering physical and mental stimulation is very useful, but it is a lot more complicated when injured or sick animals presents some discomfort or pain which requires daily treatment. That's why using training programs with healthy animals prepares them and us to resolve future problems.

This is where the importance of this paper is reflected, the hyena was an old and non-trained animal and yet it was able to learn the exercises needed for the treatment while he was in soreness. Being in discomfort scenarios for long periods of time creates stress episodes on individuals and predisposes unwanted behaviors, so the training and enrichment are excellent occupational therapy. The hyena showed a magnificent response to training and enrichment and we can supply the medical treatment efficiently.

Striped hyenas are known for living in couples and sometimes in groups. At Africam Safari there were a couple of males (brothers) who were hand reared and were in the enrichment program. They used to have a good relationship, including grooming, playing, resting and even eating together.

For unknown reasons one of them starting over grooming himself, which lead to some wounds on his left foot. At first the cleaning of the wounds were administered from a safe distance. But the over grooming would not stop, therefore the wounds would never heal. We decided that the best option was to take him to the veterinary hospital where we could sedate him and clean the wounds more properly.



Anesthesia procedures are both expensive and dangerous. Anesthetizing an animal two or three times per day is not the best option. Adding the isolation to this could lead to behavioral and other health problems. He just could not stand being locked inside which could result in some injuries on his feet because he kept scratching the door. There is evidence that training is an excellent occupational therapy, so we decided to begin with sessions. Hyenas have strong skull and jaw bones so we determined that the safest way to do it was using protective contact.

Training

We started doing a list of what behaviors that we needed him to learn. Our priority was healing the wounds on his foot.

- **Come:** This was the first command that we taught him. We required this because there was no way to obligate him to go inside the compression cage where the sessions would take place. At the beginning we had to bribe him to go inside, then gradually he realized that being inside the cage meant he would get treats.
- **Touch:** Initially we used a bamboo target to get him into some positions inside the cage. Once he got used to the target, we switched to using a hand. That would give us both free hands to do any procedure.
- **Immersion:** Our main objective was that he put his foot inside a bucket with chlorhexidine for at least 10 minutes per session. We started filling the bucket with warm water because we did not know if he was going to drink the contents of the container, then cold water, and finally chlorhexidine.
- **Hand:** A command to give him extra physical activity. At the same time, we could check his paws.
- **Side:** The position where he needed to be to complete the immersion.
- **Inside:** For our safety while we were placing the enrichment or cleaning we needed him to be locked in. He got used to it very quickly. He remained calm and the scratching stopped.
- **Down:** A behavior that would make him lay down for an ultrasound or for a physical revision.
- **Mouth:** This would help us check his teeth, tongue and gums.



With these behaviors we could do a lot of things with him such as a complete physical. This included checking ears, eyes, taking his temperature, abdominal palpation, heart rate and breathing. Administration of injections. Taking blood samples with the help of a device that we designed that would protect us from any bites, he had to put his left arm inside which left the cephalic vein exposed. Prevention of fleas with Revolution®. The administration of Lactulax® as he started being constipated for the lack of activity. Checking his paws and claws periodically.

This is the important part of the work. We know that training for medical procedures is something preventive. It is very difficult to teach any animal to do something that causes pain. He was already wounded and in pain and he let us do the treatments twice a day.

Problems

During the training sessions we faced some difficulties. The most important one was what to give him as reinforcement. The obvious answer would be beef or chicken, but because of his excessive taste for them he could not concentrate during the sessions. We started trying with different treats such as bananas, apples, small pieces of mice, milk powder. Nothing worked as well as cereal. We discovered that besides the cereal, he enjoyed the human touch. Sometimes as reinforcement we just scratched his back, neck and belly.

Another problem arose when we introduced the bucket with chlorhexidine. The first time we put it in the cage he



didn't liked it, so he broke it. The same happened with our device for taking blood samples. He was very clever, so enrichment was a real challenge for us. He always found a way to solve every problem that we presented to him.

Reintroduction

Fortunately for him (unfortunately for the training sessions) he was cured and we took him back to his exhibit area with his brother. They spent one week watching, smelling and hearing each other. After that we decided that it was time to open the gate and let them be together.

We prepared a lot of enrichment and put it all across the exhibit area so they would direct their attention to the enrichment instead of attacking each other. It was a complete success and after a couple of days they were coexisting as if nothing had happened.



Operant Conditioning in Bats Helps Study Their Vision

Clément Cechetto, Annemarie Surlykke

Dept. Biology, SDU, University of Southern Denmark

Bats use echolocation to hunt and navigate. Most bat species have developed complex laryngeal echolocation and due to the effectiveness in terms of perceptual detail that is available to bats through echolocation, their use of vision has largely been ignored. In fact, all species of bats possess eyes, which presumably are of adaptive value to bats, since eyes that are of no use have been shown to disappear in other vertebrate species (e.g. *Astyanax mexicanus*). Few experiments exist, but a few species of echolocating bats seem to be able to use vision in dim light as a navigational cue or even, in rare cases, as a hunting cue. We aim to shed light on this understudied field of bats' sensory ecology. We started by assessing vision in two species of vespertilionid bats (*Myotis daubentonii* and *Nyctalus nyctalus*). We use operant conditioning to first determine the intensity threshold in these bats. The bats were trained and tested while crawling on a Y-shaped platform in a psychophysical 2AFC paradigm with a weighted staircase method (one down/three up). The first results suggest that these bats are able to see green light (~540 nm) at intensities as low as moonless starlight (i.e. 0.03 lux). This experiment will be expanded with different wavelengths and backed up by physiological and anatomical data.

Infancy to Adulthood: The Growth, Development and Nurturing of a Behavioral Husbandry Program

Michelle Skurski and Katie Leighty

Disney's Animal Kingdom

In 1998, Disney's Animal Kingdom opened and our Behavioral Husbandry program was in its infancy. In the 17 years that followed, much like raising a child, our program has gone through numerous life stages. In the early years, we were busy developing and implementing a programmatic framework; SPIDER. Through our clumsy toddler years we were there for every step, assisting animal care teams anywhere needed, from training new shifting behaviors to participation in medical procedures. This was a time when we were building capacity in our animal keepers. The rebellious teenage years were a handful to manage; keepers were more independent and at times hesitant to ask for help when facing new challenges. Together we worked through our growing pains and are now entering adulthood. Given the age of our park, our animal care teams are now strategically managing both geriatric animals in the collection while also planning for growth in their areas including bringing in new animals, new species and modifying exhibits. Over this time, our Behavioral Husbandry team moved around quite a bit in terms of its leadership and structure within our animal care team. It has now happily found its home in the Science department. This grounding in science has provided the perfect opportunity to review our program, documents and procedures much as we did in the early days of SPIDER. This presentation will discuss the natural transitions in the life of a behavioral husbandry program and provide tips for dealing with the inevitable bumps in the road.

In 1998, Disney's Animal Kingdom opened and our Behavioral Husbandry program was in its infancy. In the 17 years that have followed, much like raising a child, our program has gone through numerous life stages. Our hope is to share the successes and challenges each of those stages brought to our program. In the early years we were busy developing and implementing a programmatic framework: SPIDER. The framework brought consistency and a process to our programs. We spent many years working with the teams to organize all of their training and enrichment documents. Notebooks were created that served as historical records, training tools for new staff and a way of communicating amongst the team members. There were over 80 notebooks created to organize all training and enrichment information. The behavioral husbandry team was there for every step, assisting teams in how to apply and work through the framework. Managing animals through a positive reinforcement based program was still new for many staff and animals. The Behavioral Husbandry team was coaching managers and keepers as they were developing their training skills. The development of partnerships with our veterinarians, research and nutrition departments in the goal setting, planning and implementing of the both the training and enrichment programs was crucial at this time.

Through what we refer to as our "thinking" years the program was gaining independence. There was a lot of animal training taking place and staff was starting to work independently. Staff was testing the boundaries and working with species previously not worked in this manner. Behavioral Husbandry was assisting animal care teams anywhere needed, from training new shifting behaviors to participation in medical procedures. This was a time when we were building capacity in our animal keepers. This was an exciting time for our program. The partnerships between animal care teams and other departments were strong and enabled very successful medical procedures through the use of a training program.

When we started into those rebellious early teenage years, the teams began asserting their own

identity, the program was a handful to manage. Animal care teams were more independent and at times hesitant to ask for help when facing challenges. Similar to teenagers learning a new skill, such as driving, and feel they need no assistance. The framework of the program, the glue that was holding the program together, was in some cases thrown to the side. There were questions of why we needed the framework if training and enrichment was taking place. Behaviors started to regress because of communication and consistency issues. The Behavioral Husbandry staff was spending more time having to react to behavior break down and team dynamics than focusing on program structure and being proactive. It was time to put some limits and structure back into the program.

It was about this time that the Behavioral Husbandry team reorganized and happily found its home in the Science department. This grounding in science provided the perfect opportunity to review our program, documents and procedures much as we did in the early days of SPIDER. Together we worked through our growing pains and are now entering adulthood. During this time we realized keepers skills have changed. New keepers have come in with some base knowledge of animal training and there are highly skilled trainers with experience in zoo settings. Partnering within our science team we have developed a new introductory course for our staff, created a more advanced training course and offer specialty workshops on learning theory. The need for continued education has been embraced by the staff and we believe will be the catapult for a new and exciting time in our program.

Given the age of our park, our animal care teams are now strategically managing both geriatric animals in the collection while also planning for growth in their areas including bringing in new animals, new species and modifying exhibits. As we continue to mature, the hope is that we will nurture the skills of our staff, create a healthy independence within the confines of the program framework, while at the same time being prepared and flexible to assist with the inevitable bumps in the road.

Building Confidence and Curiosity - Teaching an Elephant How To Use Enrichment

Holger Wisbøl, Pernille Andersen, Rasmus Pedersen

Copenhagen Zoo

The Elephant team would like to make a presentation about one of our elephants, Julia. She arrived about 3 years ago, and she has a very characteristic, stereotypical behaviour: she weaves and shakes her head a large part of the day. The Zoo would like to diminish said behaviour and started a programme (the "Julia-programme"), where the keepers and the training coordinator, came up with a plan to do exactly that, through enrichment and training.

We immediately learned that she did not do well with, even very simple, enrichment. She did not seem very curious in her environment, and she also seemed to lack confidence in her ability to manipulate her surroundings. We therefore had to start out slow with extremely simple enrichment, and then work our way up to more complicated stuff, otherwise she would give up at once and resume weaving. We also had to consider things like the fact that she would prefer to weave while using an enrichment object, so we had to take certain precautions to avoid "self-reinforcing" unwanted behaviour.

We have some footage of her first encounter with the very simple enrichment, and then we would like to compare it to the present day, to show her/our progress.

The reason we would like to make this presentation is to share our story, and perhaps bring inspiration to others who might have similar problems. We would like to underline the importance of knowing the individual so as to better suit their enrichment to their needs.

Our presentation is about a case where we were reminded that our animals do have individual needs/limitations when it comes to enrichment. The case we are talking about is when we got a new elephant cow, Julia. Julia arrived at Copenhagen Zoo in Sep. '12. At the time she was about 24 so now she is about 27. That would make her the 2nd oldest in the herd, which consists of four cows in total, and she is also 2nd in rank.

When she first arrived it was evident that she had a very distinct, stereotypical behavior. Like a lot of other elephants in captivity she tends to weave a lot. On top of that she shakes her head while weaving. She would perform this behavior for most of the day, even while she was eating.

Julia responded very poorly to enrichment and would give up on, even very simple enrichment and resume weaving almost immediately. She would also lose concentration on whatever she was doing when keepers would walk by, and direct her focus towards them and weave furiously whilst doing so. (You could ask yourself; maybe this is some sort of begging behavior that is reinforced by the presence of the keepers.)

For example if you gave her a normal "feeder" that we use for all the other elephants, she wouldn't know at that time how to use it. The "feeders" that we use in Copenhagen zoo are just very tough, plastic containers with a hole in them for carrots that we give to the elephants. Then the elephants usually just shake it, or throw around it until the carrots fall out.

At the same time she also seemed to have a general lack of curiosity in her environment and a lack

of confidence in her ability to manipulate it. I.e. if you were to put a carrot on the fence, on eye level, she would completely overlook it.

After she arrived at the zoo, management and keepers agreed to make an extra effort to minimize the time she would engage in this stereotypical behavior, and "The Jula Program" was started. It started in cooperation with our training coordinator, Annette, and we then set out to "Diminish the behavior through training and enrichment."

We decided to map out where and when she would perform the behavior the most, and then focus our attention towards those periods and places. We for instance tried moving her from her training stall, which seemed to be a hotspot for her rocking, to another, and found out it had a positive effect.

One of the other problems was, as we mentioned, that she didn't do well with the enrichment offered to her. She would be hard to get in contact with, and we even tried with a few types of medication to make her "snap out of it", just so that we could get in contact with her. We therefore had to go back to basics and take it down a notch.

We had to reconsider what we ourselves thought to be "very simple" enrichment. For instance, we gave her things like an empty cardboard box and then reinforced her for interacting with it.

From there we went on to interaction with a large plastic feeder, where the food would fall out with barely a touch.

As a side note, when she then got the hang of this we learned that we had to tie the feeder down, so that she could not stand with it in her trunk and weave at the same time. We for instance put the feeder on the outside of the bars and chained it to the floor to avoid self-reinforcing the unwanted behavior. We would start out with small food items in the feeder, and then slowly work our way up to larger pieces making the challenge harder in small steps, over a period of about 2 months.

So, where are we now? We definitely have a more confident and curious elephant now, than we did at the beginning. For instance she knows how to work all of the enrichment items that we provide her with. She is quick to figure out new, fairly complicated enrichment items, even if they don't give off an immediate reward. For example she will work stubbornly with an item without giving up. She might take a break to look around the facilities, but then come back and resume working on her enrichment.

We gradually observe her playing more and more on her own as well. That is something we haven't really seen so much in the first two years since she came here. She even uses non-food-based enrichment in her playing, also a new behavior. Just last month a colleague observed her taking a feeder filled with carrots, carry it to the outside pool, and "flush" out the carrots with water.

Because of all this extra behavior that she did not perform in the beginning, we can conclude that the amount of time spent weaving and head shaking is diminished considerably.

She does still preform this stereotypical behavior a large part of the day. That is something that we may never be rid of, and we will continue our work with this problem, and the fact that we now see her using the enrichment and her environment enthusiastically, we consider a huge success, and it says a lot about what you can achieve if you consider the needs of the individual when it comes to training and enrichment.

The Advantages and Disadvantages of Whole Carcass Feedings

Kirstin Anderson Hansen

University of Southern Denmark, Odense Zoo

Whole carcass feeding often comes with a discussion or debate about animal ethics. Arguments are often that the public can't or won't understand, it is inhumane and unethical, or it is gross and disgusting.

In Odense Zoo, the carnivores are fed with whole carcasses every week. Horses, cows, and goats that are donated to the Zoo, or other animals that are culled from the Zoo's own population, are used during these feedings that occur during the Zoo's open hours so the guest can see and enjoy carnivore behavior.

More importantly, this kind of enrichment allows for the establishment of social behavior, social hierarchy, stimulates hunting behavior, and provides excellent physical stimulation, as well as the nutritional benefits.

In the presentation I would like to present the advantages and disadvantages of whole carcass feeding and how the carnivores and guests are able to reap the benefits of this type of enrichment every day.

A Touching Experience

Ashleigh Clews

National Aquarium

Touch tanks and elasmobranch training are both hot topics in the public aquarium industry. This presentation discusses training methods employed with stingrays and skates acquired for a National Aquarium touch exhibit opening in 2015.

At concept development, there was a clear expectation that guests would readily be able to touch animals in an exhibit that supported exceptional animal health. Staff identified deliberate respondent and operating training pre-opening as critical to meeting these goals. Purposeful training was identified as the only way to increase the likelihood animals would voluntarily participate in touch interactions. Multiple staff members from quarantine, animal programs, veterinary, and husbandry groups were involved in training approximately 25 animals over a period of 18 months.

In the shallower tray systems, techniques included staff putting hands in water during feeding and offering food by hand. Most animals readily approach hands, touched hands, and permitted acceptable levels of tactile interaction without detailed positive reinforcement training plans. For animals that did not meet behavior goals, more detailed plans were utilized.

In the deeper holding systems, target training with artificial hand targets was used. Additional work with one ray in particular has focused on the goal of training this ray to swim onto a platform, be lifted towards the surface and stay on the platform while being touched.

Challenges included staffing levels/training experience, quarantine/medical needs and enclosure access. This presentation focuses on how these challenges have been addressed, the training methods employed and the animals' progress on each of these training goals.

Introduction

Touch tanks are a frequently discussed topic among public aquariums. Most would agree that there are both education and conservation opportunities available when the public is allowed to have an intimate experience with the animals. But, along with these touch opportunities comes a potentially stressful situation for the animals.

Facilities that have touch tanks use a variety of designs, protocols and staffing schedules. Animals typically used in touch tanks are elasmobranchs such as skates, rays and sharks and invertebrates such as sea stars, horseshoe crabs and urchins. This paper will focus on the preparation of the elasmobranchs acquired for the touch exhibit at National Aquarium.

Background

In 2012, after several years without a touch tank, the National Aquarium started planning for a new touch exhibit to open in 2015. A variety of thematic ideas were discussed before settling on focusing on the shores of the Atlantic Ocean. Most of the National Aquarium's visitors are from the Mid-Atlantic region of

the United States and, if visiting the eastern shore, would likely encounter some of the animals represented in the exhibit. The aquarium decided to take this opportunity to tell a story about our shores, beach etiquette and conservation.

Early in the process, high expectations were set and were clearly defined. They included that the animals in the exhibit would be ready for touching at the exhibit opening and that the guests would be guaranteed a live tactile exhibit at all times. Considering these expectations, a group was developed to discuss achieving them while meeting or exceeding the Association of Zoos and Aquariums (AZA) standards for animal care and welfare. How do we accomplish both? Is there a way to prepare the animals?

Acquisition and Quarantine

Over an 18 month period, animals were acquired and placed into the offsite quarantine/holding facility known as the Animal Care Center (ACC). This included 11 little skates (*L. erinacea*) that were captive bred, six clearnose skates (*R. eglanteria*) that were wild caught, and eight Atlantic rays (*D. sabina*) most of which were donated from other facilities with the exception of one which was rescued after being released in a freshwater pond.

Training Discussions

Staff at the ACC had nearly 2 years with the majority of the animals destined for the touch exhibit. With that time and the clear goals, staff started to discuss ways to prepare the animals. Some staff members had experience training elasmobranchs and proposed training the skates and rays to be comfortable with human touch. The decision was made to use a combination of desensitization and positive reinforcement training to prepare the animals.

Challenges

In early discussions, staff recognized likely challenges associated with the program.

- 1.) Access to animals: Holding tanks are large and deep. They range from 900 to 10,000 gallons and 18 inches to 4 feet deep.
- 2.) Quarantine period and biosecurity: Elasmobranchs are generally under a 90 day observational quarantine. During that time, they should not be moved and are considered at risk for illness and/or disease. Training and feeding equipment is dedicated to individual systems. Staff members working with quarantine systems follow strict protocols to avoid cross contamination.
- 3.) Staffing: The large quarantine facility is separated from the main aquarium. There are currently two full-time aquarists taking care of standard operational quarantine, medical cases, animals in long-term holding situations and project related acquisition.
- 4.) Resources: Due to limited onsite staffing, a number of staff members from other departments were enlisted to work with the animals and the training program. Consequently, multiple people were working with individual animals. In addition, many of the staff did not have a formal training background.

The Fabricated Fist

It was decided that guests would be asked to present a closed fist underwater with the hope that the animals would recognize the fist, swim over to it and allow two-finger touching. Since many animals were in tanks that were too deep to work closely with them, one solution was to create a lifelike forearm and hand to introduce to the animals. A variety of cast urethane fist replicas were designed and created by the Exhibits and Design team. These were then attached to long pieces of PVC and placed on tank bottoms during feeding. Pieces of food were broadcast around the fabricated fist to encourage a positive association with hands. In systems that were smaller and had fewer animals, the fabricated fist was used as an actual target. Animals were trained to touch a fist, and then receive food via pole.

The Platform

A different and more intense training approach was taken with one adult Atlantic ray. The goal was to have her swim onto a custom built platform and remain calm while it was lifted and hooked close enough to the surface to be able to physically touch her. This process included a number of steps and goals.

First, the animal was trained to a target (a green circle) that was attached to a feeding pole. Once she had learned to station and was reliably eating from the target pole, the next step was to desensitize her to parts of the platform. Initially, just the vertical poles were placed in the water and the animal was fed around and between them using the target pole until she was eating her whole ration without swimming away. Once that was achieved, the rest of the platform was introduced.

Initially, the platform was placed on the bottom of the tank and stabilized. The animal was asked to swim onto the platform to be fed via her target pole. Once the animal was comfortable and stayed on the platform for her entire ration, staff started slowly lifting and moving the platform. The goal was to get her used to the movement and to stay calmly on the platform while in motion.

For several months, the platform could only be lifted several inches from the bottom without the animal swimming off. Once she was staying and eating her entire ration, staff started lifting the platform about halfway up the side of the tank and hooking it on the lip of the tank. Many times the animal would swim off and staff had to lower the platform and start again. At times, the platform would remain on the bottom of the tank again for several days until the desired behavior was strong.

Once the animal was reliably staying on the platform halfway up the side of the tank, staff began to lift and hook it closer to the surface of the water. After close to a year of sessions, the animal stayed on the platform in this position. Staff was then able to working on hand feeding as well as touching her during and after feeding.

The Tray

One system at the offsite facility was designed to allow easier access to the animals. The tray was about 900 gallons with a depth of about 18 inches to a sandy bottom. Although smaller, this system most resembled the exhibit. Fourteen smaller/younger animals were housed in this system. This included ten little skates, three Atlantic rays and one clearnose skate.

Because of the number of animals living in the system and that it was shallow, a different approach was taken in working with these animals. Instead of utilizing operant conditioning, staff decided to desensitize the animals to touch. Initially, staff broadcast fed the animals with their hands hanging in the tank, but without actual touch. The goal here was to get the animals to make a positive association with human hands. When animals started regularly approaching hands for food, staff began to hand feed. Eventually, food was placed next to the animals and then they were touched before, during and after eating.

One Atlantic ray did not voluntarily participate in the program. She found hands aversive and started hiding away from the rest of the group during feeding. Staff working with this animal met and discussed ways to help her progress separately from the group. She was assigned a primary trainer who developed an individualized plan for her with slower approximations. Staff started pole feeding her in an area away from the group where she felt comfortable. Within weeks, she started to come out on her own to seek out the pole. Next, staff started moving their hands down the feeding pole getting closer to her. After several months, she did eventually start hand feeding. When most of the animals were moved to the exhibit, staff did not feel she was ready and held her back to continue work with her.

Since guests will not be feeding the animals, it was important that animals learn to approach hands and allow touching whether or not they are actually receiving food. Once staff felt the animals had made a positive association with human hands and were desensitized to touching, they started putting hands in the tank throughout the day with and without food. Animals continued to approach hands and lay calmly even when food was not being offered.

Living Seashore

The exhibit is a 3600 gallon undulating tank design. The depth is approximately 18 inches and it has

a sandy bottom. About 30% of the exhibit is out of reach from guests. This is an area where animals can go if they do not want to participate in being touched. It will be monitored by both paid staff and volunteers. There were several months of classroom and hands-on training provided to anyone who will be working with the animals and/or public.

Animals started moving from the ACC to the exhibit in January 2015. Staff continued to use positive reinforcement training and desensitization on the exhibit for months leading up to the opening. This gave the animals needed time to adjust to their new environment before being introduced to the public.

A 3 month acclimation schedule was developed to further aide in this adjustment. It began intermittently and then daily with small groups of people. They would enter the gallery area and walk through it or stand around for a few minutes. After several weeks of getting the animals comfortable with the increased foot traffic, some more intense hands-on interaction began. Staff from many other areas of the aquarium stopped by throughout the day to touch the animals. The gallery initially opened to the public for just several hours a day before finally having a grand opening in May 2015.

Multi-Departmental Cooperation

With the number of animals and challenges discussed, it took a large number of staff to make the training program successful. Staff from Animal Programs, Living Seashores and the Animal Care Center coordinated schedules to make the trip to the offsite facility daily. They assisted with food preparation, feeding and training. Many of these staff members would eventually be responsible for the animals on exhibit so the time spent working with the animals helped to form trust and positive relationships.

It was extremely important for all parties to communicate regularly. Consistency is key when training any animal, so staff members were constantly meeting, talking, making adjustments and exchanging ideas. Regular email updates were sent to everyone participating in the training program. In addition, a training record sheet was used with the animals that had individualized programs. Training session details were noted daily and available to everybody involved.

Future Goals

Once the exhibit is open and both animals and staff are comfortable with daily routines, the goal is to continue making progress with the training program. Additional desired behaviors include stationing, net and stretcher training and eventually voluntary medical behaviors such as weights, barb clipping and even blood draws.

Summary

The overall goal was to have animals that will allow, and even be comfortable with, touching immediately upon exhibit opening. Staff also hoped that the stress sometimes associated with animals in a touch situation would be minimal. The result will be happy and healthy animals that will voluntarily participate in educating the next generation of ocean lovers.

Training of American Alligators in Randers Tropical Zoo

Birgitte Pedersen

Randers Tropical Zoo

When I in 2010 was given the responsibility of the American Alligators in Randers Tropical Zoo, I had absolutely no experience working with these animals. Therefore I was trained by experienced keepers, who taught me to work with them in “the traditionally way”. By this I mean, looking at them from a distance, throwing some food in the water, where the alligators could fight for it. If a medical check or a shipment to the veterinarian were necessary, the normal procedure would be to catch them by jumping onto them and restraining them.

At some point, I thought there must be another way. Therefore, I started station training them, to be able to work with one individual at a time, giving me the possibility of medicating them. The biggest goal was getting them to go on shore voluntarily, and into a transport box, so I could move them safely and exercise them at the same time. All this to make the general management less stressful and safer for the animals as well as the keepers.

I would like to show and tell about the process, thoughts, challenges, problems etc. from the beginning until today, where three out of five animals can go on land, into a transport box and back into the water. Many people don't believe that you can train a reptile and work cooperatively with them. I would like to show them otherwise.

Utilizing Enhanced Desensitization Techniques with a Pack Of Beagles (*Canis lupus familiaris*)

Heather Samper

Mutts with Manners

In several desensitization definitions, exposure to the aversive stimulus and subsequent reinforcement are the common components to overcome fear. There is more to desensitization than teaching an animal to cope with an unfamiliar or aversive stimulus. The goal of this presentation is to expand upon the current desensitization techniques (exposure and reinforcement) to encompass a more holistic communication experience for the animal. As training evolves to focus on giving animals more choices, so should our communication with them. When teaching a pack of beagles to become non-reactive to a team of horses, multiple facets of desensitization techniques such as exposure, motivation, communication, timing, body language, choice, trust, and reinforcement all came into play. Each of these facets will be discussed to explain their importance in the role of expanding trainer knowledge of desensitization techniques. Finally, teaching the concept of generalization crowned a successful training goal thereby increasing confidence in a once scared pack of beagles.

The Beagle Pack

In a recent move from the city to the country, my pack of 3.0 beagles began to experience a new adventure. The scenery for daily walks now had more vegetation, farm animals, and wildlife. A scent du jour for the hound nose! One portion of our 1.25 mile road contains a large pasture of at least 100 acres, which is home to eleven horses. The horses are allowed to make their own decisions as to whom they socialize with, where they graze, and where they spend their time in the large pasture.

Shortly after our arrival we began our daily walks, slowly building up the endurance of my oldest beagle to make the trip to the end of the road and back (2.5 miles total). We had managed to pass by the horse pasture several times but the horses had not been close enough for the beagles to notice visually. I'm confident they knew of their presence via scent, as they are all trained search and rescue dogs, but had yet to pair the scent with the visual animal. One cool, crisp afternoon I spotted the horses rather close to the road. The beagles were walking on the opposite side of the road, noses to the ground, undoubtedly following the scent of some wild animal. All of a sudden, in unison, three bodies stopped and looked left. The wind was blowing directly at us allowing them to finally catch the scent of these majestic animals. The two younger beagles, four year old littermates, had never seen a horse before. Both immediately starting baying ("Arrooo") after they had stopped and looked into the pasture. "Stranger danger, mom!" While Angus was baying and feverishly trying to approach the horses his brother, Lugh, was also baying but appeared completely petrified of these giant animals and desperately tried to pull out of his collar to retreat back towards the safety of our house. The 12 year old beagle, Darwin, quickly looked away from the horses and refocused on the scent trail he was following. He had been around horses many times before and obviously didn't find them more interesting than the local wildlife he was trailing; however, due to the incessant vocalizations from the younger pair, he soon decided to join them by barking in the direction of the horses. I am standing in the middle of the road with my arms being pulled in three different directions and surrounded by loud beagle baying and barking. I can't help but laugh! Oh my, I have one of those dogs- a reactive dog an owner cannot control. Sigh. I need a dog trainer to help modify this undesirable behavior. Oh wait, I am a dog trainer!

I started to jog and encourage the beagles to follow me past the horses. There was still baying and

looking backwards but they eventually became quiet and refocused on their original task- scent trailing wildlife. On our walk to the end of the road I formulated a shaping plan of how I was going to get the beagle pack to ignore the horses and calmly walk past them based on a class I teach for reactive dogs. What a great opportunity to assess how this class is taught! Am I teaching the best methods? Do I need to alter how information is disseminated to clients so they can become better at identifying body language and communicating with their dog? Can I see progress from a reactive canine in a short period of time in a real world scenario? At the end of the road we turned around and made our way back towards the pasture to get home. The same scenario played out again as we passed the horses, but I couldn't wait to get started on training. One caveat I should mention is that training this behavior would be contingent upon the location of the horses. If they were too far out in the pasture, the beagles wouldn't see or smell them and subsequently wouldn't react to them. This plan would only work when the horses were within close proximity of the road, which was completely out of my control. I was confident this could be accomplished in a few sessions, yet fully aware it could take months to actually train.

What is Desensitization?

The title of this paper is Utilizing Enhanced Desensitization Techniques, but first I should define desensitization before I explain how to enhance it. Dictionary.com defines desensitization as 1) the act or process of desensitizing 2) (physiology) the elimination or reduction of natural or acquired reactivity or sensitivity to an external stimulus, such as an allergen 3) (psychiatry) a behavior modification technique, used especially in treating phobias, in which panic or other undesirable emotional response to a given stimulus is reduced or extinguished, especially by repeated exposure to that stimulus. Definition three more closely parallels the animal behavior management field and the words "emotional response" and "repeated exposure" are highlights of this definition.

The book Animal Training defines desensitization as the process of getting an animal used to a new stimulus through gradual exposure to it. A slow, calm introduction to new things will maintain the animal's trust and facilitate better care. Highlights of this definition are "gradual exposure" and "slow, calm introduction".

The Animal Behavior Management Alliance defines desensitization as: The lessening or disappearance of a response accomplished by the pairing of a positive reinforcer with the presentation of the stimulus. Typically used to "train out" fear to a stimulus, and typically done by presenting small steps leading to the final behavioral objective, with each small step paired heavily with a positive reinforcer. Highlights of this definition are "lessening of a response", "small steps", and "pairing of a positive reinforcer".

These definitions shed light on what I'm trying to accomplish but there is still something missing to fully explain the larger concept of learning. Hurley and Holmes, 1998 shed more light on what I'm trying to accomplish by defining the desensitization process further. Desensitization involves habituation and counter-conditioning practices. Counter conditioning is the process where normal defense reactions elicited by an aversive stimulus are modified by association with a positive reinforcer.

Some of those definitions have a lot of technical jargon. The definitions I referenced earlier contain a few common threads- repeated exposure, gradual exposure, positive reinforcers- but they fail to capture the full capacity in which desensitization can assist in the reaction to a novel or aversive stimulus. There are more ways we can communicate to animals that encounter novel or aversive stimuli to encourage them to learn more efficiently and effectively. How can we make sure animals in our care have truly overcome their fears not just appeared to have conquered them because they perform a skill? I want to make sure the beagles don't just walk quietly by the horses. I want to make sure they walk quietly and calmly with confidence that they are completely safe in the presence of the horses.

The Training Plan

Every choice in life has a consequence. It's how we learn and is true for any behavior, regardless of species. What consequence do the beagles receive for reacting negatively to the horses? The horses do not retreat nor do they charge. They merely stand still looking at these small, noisy, four-legged fuzzy creatures attached to a human. For my training purposes, the reason for the reactivity does not matter. There

are three goals I want to teach the beagles: 1) they have the power to choose a consequence (a reinforcer or a punisher) 2) learn to choose the “better” consequence (reinforcer) on their own as quickly as possible upon noticing the trigger (the horses) 3) display calm body language in the presence of the trigger which will help keep them calm internally. As they accomplish these goals I anticipate their confidence will slowly build in the presence of the horses, not because they become unafraid but because they will have learned new empowerment skills.

The training plan involves a keen eye on body language and a training technique called BAT- Behavior Adjustment Training- created by Grisha Stewart, MA, CPDT-KA, KPACTP from Ahimsa Dog Training. Her website, <http://www.empoweredanimals.com>, has a beautiful flow chart of BAT. Dr. Sophia Yin created an extremely useful reference sheet of fear and anxiety body language in canines. You can download this at <http://info.drSophiaYin.com/free-poster-on-body-language-in-dogs/>. Recognizing changes in body language in the beagles was the first step to successfully utilizing enhanced desensitization. Knowledge of calm, relaxed behavior is just as important as recognizing stressed and anxious behaviors. Subtle changes in body language, either from calm to stressed or stressed to calm, need to become instant cues to the trainer to communicate back to the animal. If you miss these subtle changes then you are missing valuable opportunities to communicate to your animal about choosing consequences and the reactive cycle will be difficult to diminish.

There are 5 basic components to the shaping plan: 1) trainer recognizes changes in beagles body language- stressed and calm 2) beagles willingly take reinforcer 3) beagles acknowledge trainer 4) beagles recognize more valuable reinforcer 5) beagles ignore distraction.

Component 1) After becoming familiar with what body language canines exhibit under stressful and calm situations, as well as the body language of each individual beagle, I feel confident in recognizing changes and then communicating (bridge and reinforce) to each beagle that calm body language earns a reward. For example, ears forward with eyes focused on the horses then slightly becoming less anxious with the ears returning to the relaxed position on the side. Even if the visual focus is still on the horses I bridge and reinforce to acknowledge the subtle change of the ears.

Component 2) Fortunately beagles are known for their love of food which is quite advantageous in learning to ignore this scary trigger. The primary reinforcer will be their regular dog kibble with a few yummy treats periodically. Secondary reinforcers will be praise and tactile which I will also use with the food reinforcers. Will they easily accept a reinforcer in the presence of the horses or will being over threshold and too stressed prevent them to accept such a reinforcer? Time will tell. We build up to that threshold point by receiving secondary and primary reinforcers on all our walks by the pasture when I recognize calm body language, whether the horses are out of sight or within scent distance. With this positive reinforcement history the next opportunity to train in the presence of the horses, which will put the beagles at or over threshold, will hopefully yield beagles very receptive to a variety of reinforcers.

Component 3) Upon spotting the horses, beagle vocalizing will be inevitable and almost immediate. Their intense focus solely on the horses needs to change to me. By feeding each beagle when he is quiet, even if it is a brief pause in vocalizing, their focus will slowly turn from the horses to me (and the food). As they learn to listen while visually focused on the horses, I will review name recognition. By acknowledging their name in the presence of the horses they will soon be able to recognize there is a choice to make when vocalizing. Acknowledging the trainer can be very rewarding in a stressful situation!

Component 4) As each beagle learns that less vocalizing and/or calmer body language in the presence of the horses earns a variety of rewards there will be fewer barks and/or less intense barks. Body language starts to shift from a tense body focused towards the horses to more fluid movement between me and the horses; perked ears become more relaxed; tails begin to wag instead of being in a fixed position; eyes are less focused on the horses and are able to scan the environment again. Ideally, I am looking for a beagle to look at me on his own after looking at a horse, all while remaining calm and quiet as if to say “look mom there’s a horse and I did not react”. This behavior is highly reinforced because he is recognizing the consequence with more value! I want each beagle to continue to make this choice frequently, especially when anxious/stressed, and with less interjection from me.

Component 5) This checking-in behavior (look at horse without reacting then look at trainer for

feedback) starts to occur more quickly upon first noticing the horses. Looking at the horses should occur calmly instead of reactively. Can the recognition of the horses turn into a cue for not vocalizing, displaying calm/relaxed body language, and to looking at the trainer for information- affirmation of a job well done or another behavior to perform? Absolutely! Ideally the horses will receive just a glance as the wildlife scent trail becomes the greater beagle priority.

Training Progress

With each daily walk, I go prepared with treats in the pocket, eager to teach the beagles that ignoring the horses is a better choice than barking, lunging, or evading them. Several days pass before I'm actually able to work on my first session. Just as with their first encounter, noses are on the ground trailing wildlife. I see the horses near the fence line before the beagles do. I call each of their names and give them a reinforcer just to remind them that calm body language and name recognition will be rewarded, then we continue walking. Their gaze is on me because now they know I have food but it doesn't last long, which I fully expected. Lunging and baying starts from the younger pair while Darwin attempts to continue trailing on the vegetation. I approach the closest beagle first, Lugh, with a small handful of treats. The only goal for this session is to reward the beagles for being quiet. At his first breath of air between baying I feed him by practically placing the kibble in his open mouth. Still focused on the horses Lugh vocalizes again. "Woof, woof", pause, and I feed him another treat. He slowly looks at me instead of the horses and I feed him several more treats and start doling out the praise. "Good boy!" I repeatedly tell him with excitement while delivering periodic treats. I start walking towards Angus at the front of the line and continue to reward Lugh with food for being quiet. This smart pup has just figured out looking at me and not barking equals a treat! As we approach Angus there is now competition for food. Angus is bit more torn between barking and eating but we continue walking past the horses, rewarding both beagles for being quiet. Darwin got a nice handful of treats too for being a quiet, stellar beagle. This same scenario plays out again after we turn around at the end of the road and make our return trip home. I am pleased at the learning curve the beagles displayed and am encouraged that mastering this behavior will occur quickly.



Every walk by the pasture holds an opportunity. Each time the horses are near the fence line we are able to practice the concept of receiving treats for being quiet and looking at me as we walk by. Everything from the beagles is voluntary. My only intervention is calling their name to break a long stare or excessive barking. The first few sessions start on the opposite side of the road because this increased distance sets the beagles up for success by keeping them under threshold, thereby minimizing their reactivity. This allows us to practice the concept of being quiet more effectively. Can you imagine their anxiety if I attempted this initial training at the fence line with the horses merely inches away? It would be extremely detrimental and take much longer to achieve success! As the pups grasp the concept of the game, our next sessions focus more on body language.

I begin looking for tiny movements in their body indicating lower levels of stress, then bridging and reinforcing. Examples include changes in ear position, tail position, overall musculature, gaze, direction of travel, and body orientation. Let's take the body language of stopping and standing with tense musculature looking at the horses. A beagle can be standing still with tense musculature and ears forward or standing still with tense musculature with ears on the side. What's the difference? Ears on the side indicates a more relaxed posture. What's being reinforced when ears change from forward to side? The behavior of standing still or the tiniest physiological response of being calm/relaxed? I am specifically communicating the change from ears forward to ears relaxed then reinforcing that change, thereby telling the beagle that being slightly relaxed in the presence of a horse will earn you a reward. Ah-ha! The beagles catch on quickly and more relaxed body language begins to occur- less tense musculature while standing, tail begins to wag again or rises from a tucked position, gaze is taken off the horses quicker and for longer periods of

time, body orients away from the horse. All of these subtle changes are bridged and reinforced. While these external changes do not allow you to see internal changes, they are occurring. From a slower heart rate or deeper breathing to less barking or types/amounts of chemicals being released, these internal changes affect the external body language the trainer is identifying and attempting to interpret back to the beagle.

Back to training... as we make progress on being more quiet and displaying calmer body language, it's time to get a few feet closer to the horses and approach the original threshold of reactivity. Did the beagles notice the change in distance or regress at all? No! Actually, each session yields faster results- decreased barking intensity, less frequent barking, faster change of body language from stressed/anxious to calm, and more focus on me. Greater magnitude of reinforcement for ignoring the horses in the first place, despite the lapse of time between sessions, was a powerful reinforcer and motivator for the beagles. On one of our walks with the horses close to the fence line, Angus surpassed my initial expectations and felt confident enough to lead the pack from the middle of the road to the same side of the road as the horses. Each beagle calmly and slowly walked by the horses a few feet away, even pausing briefly to take a better look at these majestic animals. That earned them all a huge reinforcer!

Due to the sheer size of the pasture and the horses' freedom to roam within the pasture the beagles finally learned to overcome their fear of horses in only seven sessions over the course of three months. A few weeks later the beagles surpassed my expectations and developed the confidence to personally say hello to a horse trio. Nose-to-nose, it was very exciting! Fear had turned to intrigue and body language for each beagle was quite relaxed during this encounter. Each time we walk by the pasture and the horses are close enough for me to say hello (either verbally or physically with a scratch on the face), the beagle pack follows me to the fence line, looks up at them as if to acknowledge them, then calmly returns to their favorite pastime of scent trailing. No longer is there drama on our walk by the horses!



Utilizing Choices

The other facets of desensitization techniques that allowed the beagles to learn quickly and successfully were incorporated rather simultaneously in the training process, but were equally important in how the beagles processed information.

Exposure to the horses was done gradually from the opposite side of the road to the nearer side of the road. Even with the tastiest of reinforcers, starting on the nearer side of the road would have kept the beagles in such a stressed state that it would have taken much longer to teach them. Why have them over-threshold and in a constant state of anxiety to teach a behavior? The horses were not close enough to encounter daily and the anxious anticipation from the beagles slowly diminished over time.

Motivation is the key to successful learning. For the beagles, that motivation was food. But it's different for every animal. Some need a social aspect or distance thresholds, others just need praise or attention. Keeping the beagles motivated not only with their regular kibble but with random yummy treats allowed me to be slightly more valuable than the horses.

Overly communicating is difficult. How many times have you played the training game with peers and the person playing the role of the animal afterward said the trainer gave too much information? The answer is usually too little information, which is why we see frustration and/or aggression in our animals. Each session with the horses, near constant communication to the beagles was vital in how quickly they learned to be quiet and to display calm body language. They eventually learned about choices and empowerment but it would have taken longer if I had not given them a lot of feedback during the training process.

The timing of the bridge is the key to effective communication. Too soon or too late and the valuable information you are trying to convey is not relayed accurately. In the sessions dealing with less vocalizing, bridging occurred on a pause, sometimes just a split second between rapid barks. Poor timing could actually encourage more barking. In the sessions dealing with body language a missed change from

anxious to calm could have led to less display of calm body language if none of it was being acknowledged. Merely waiting for the intensity to stop on its own is not setting the animal or the trainer up for success.

Learning to make a choice is quite powerful for an animal. It should be fun but also fundamental in how to learn. Whether it's learning about consequences or learning a behavior, the power to choose is something a trainer can guide but ultimately the animal must do. The beagle pack could choose to ignore the team of horses or choose to ignore the trainer with the treats, both of which I had to be willing to accept. There is no reason for me to get agitated if the beagles reacted to the horses or to punish them for reacting. If the animal chooses the poorer choice, it's a cue to the trainer that we've pushed too hard, not communicated effectively, or have poor quality reinforcers.

Most importantly is trust. As the beagles learned all these concepts and began to make choices they had to trust that I would allow them to make that choice. No coercing to make a particular choice, no reprimanding for making a poor choice, and above all allowing regression to happen. While walking on the side of the road close to the horses, if one beagle pulls to the opposite side as a horse inches closer what should I do? I allow him to go to the opposite side to add distance and decrease his anxiety. Forcing him to stay only fuels my ego, it does nothing to build his trust or confidence.

Generalization

Finally, teaching the concept of generalization crowned a successful training goal thereby increasing confidence in a once scared pack of beagles. Why is generalization important? It builds confidence, it allows animals to draw on past experiences and make choices, and it's part of a successful shaping plan to achieve this learning curve. After the beagles learned to ignore the horses, we went on several excursions in different cities to test their newly learned skill on a variety of novel stimuli. They walked by and ignored a herd of cattle and a flock of waterfowl which they had never seen before. They also met individual unknown horses calmly on several different occasions. I'm so proud of them! As a trainer, this is another affirmation that reactive animals can successfully be taught to ignore their reactive triggers and learn new



skills to make better choices.

Final Thoughts

Every experience is a learning experience. Communication and body language awareness were key to letting the beagles know what behaviors were not appropriate (baying and lunging) and what behaviors were appropriate (calm body language, not vocalizing, and walking). The skill of calmly and quietly walking by the horses and eventually meeting them happened over time; it was not a specific step in the shaping plan. This learning experience for the beagles built their confidence around novel and aversive stimuli. The trainer merely focused on body language and communicating to the beagles. When the beagles were ready to proceed closer to the horses they did; fears were conquered and new empowerment skills developed. What's next for the pack of beagles? Learning to ignore their arch-nemesis... the bunny rabbit!

References

Hurley, J. and Holmes, N., 1998. "A review of psychological principles and training techniques associated with desensitization." *Marine Mammals: Public Display and Research*. 3(1): 16-26.

Ramirez, Ken. *Animal Training: Successful Animal Management Through Positive Reinforcement*. Shedd Aquarium, Chicago. 1999.

Stewart, Grisha. How to do BAT 2.0. Retrieved from <http://www.empoweredanimals.com/more/bat-steps-for-reactivity/>

The Animal Behavior Management Alliance. Glossary of Terms. Retrieved from <http://www.theabma.org/glossary>

Yin, Sophia. 2015. Body language of fear in dogs. Retrieved from <http://info.drSophiaYin.com/free-poster-on-body-language-in-dogs/>

Influence of Positive Human-Animal Relationship through Positive Reinforcement Technique on Behavior and Adrenal Activity of Chinese Leopards (*Panthera pardus japonensis*) and Snow Leopards (*Uncia uncia*)

**Aude Bourgeois, Amandine Puaux, Juliette Roos, Muriel Kohl, Norin Chai
Muséum National d'Histoire Naturelle**

Most studies suggesting that human-animal relationship has an impact on animal welfare, focus on farm animals. This study aims to assess the influence of positive human-animal relationship through positive reinforcement training on behavior and fecal glucocorticoid levels in two species of captive felids. The behavior of a male and two female Chinese leopards (*Panthera pardus japonensis*) and a male and a female snow leopard (*Uncia uncia*) was monitored during 6 months. Concentrations of fecal cortisol metabolites were determined by enzyme immunoassay technique. First, we measured the influence of the visitors and keepers on the felid's behavior and adrenal activity. Second, we examined the variation of these indicators after the establishment of a training program.

Negative behaviors (vigilance toward human, fear, stereotypy and agonistic behavior) significantly increased in all subjects, as noise levels and movement of the crowd increased. We found no significant effects of crowd size or public density on the behavior of the animals. Evenly, negative behaviors increased with negative or neutral keeper-animal interaction.

The positive reinforcement training had a number of positive effects on behavior and fecal glucocorticoid level. Negative behaviors tended to decrease and we observed a significant increase in positive behavior in the presence of keepers. There was a significant difference in fecal corticoid concentrations before and after the training implementation except with one female snow leopard which was under treatment for health matters during the study. These findings indicate that keeper-animal relationship can improve the welfare of captive felids.

Eradicating Fear and Anxiety of Confinement, With Hamadryas Baboons

Marc Alcott

Copenhagen Zoo

For years on end, the approach to the daily management of Copenhagen Zoo's troop of hamadryas baboons (Papio hamadryas) has been a dispirited routine, involving the practice of threats and enticement, when moving the troop from point A to point B, and/or when a sedation of an individual was scheduled. It's common knowledge, that this would not be tolerated today, especially with all the knowledge available. Nonetheless, this was the starting point for us, as our animal trainer coordinator Annette Pedersen and the primate keepers at Copenhagen Zoo began a 2½ year (and pending!) journey, to eradicate all negative associated behavior, imprinted within the baboons for many years, leaving them with zero trust, in us keepers.

The challenges of remote training a troop of baboons, asking of them to enter an enclosure, being locked in a confined space where absolutely all possible negative relation is associated with, is what has been the challenge and time consuming operation we have undergone. Being tested several times a day on our training skills, has been the motivational factor for us all. We've hit rock bottom on several occasions, come across unthinkable obstacles and committed all possible mistakes, and that's what has motivated us to keep improving on the baboon training twice a day, every day for almost 900 days straight now.

Training the baboons has tested our knowledge on the fundamental issues of training, but along the dozens of unimaginable obstacles we encountered, we've gained skills and experience, not found in any books.

Positive Reinforcement as a Replacement of the Antique Training Methods at Elephant Camps in Asia

Gerardo Martinez and John Roberts

Golden Triangle Asian Elephant Foundation and Africam Safari

In many Asian countries, the elephants have been trained to do, among other things, strenuous physical work and to participate in the tourist and entertainment industries. Furthermore, the training that they have received for these tasks has always been a subject of discussion because of the aggressive methods often used.

The “mahouts”, whom are the people that handle the elephants, have ancient training methods that have evolved not only for dangerous free contact, but mournfully in the necessity to sometimes impose certain degree of firmness and roughness directed towards the elephants. What is surprising though is that this practice of intimidation has not changed throughout the years despite the long list of injuries and fatalities of mahouts, passersby, and elephants alike, arguably attributed directly to the use of these practices.

That is why The Golden Triangle Asian Elephant Foundation in Thailand, has been teaching mahouts from Thailand, Laos and Cambodia in how to handle their elephants through the use of safe and harmless methods and how to convince the elephants to cooperate voluntarily without being threatened or harmed in order to receive the proper care they need. The most difficult task of this “Positive Reinforcement Project” has been to convince the mahouts, whom are talented and with invaluable skills, to let go of the practices they have been taught and have been following for many centuries. Nonetheless, many of them have been very receptive of our work, and we have achieved remarkable results with both, the mahouts and their elephants.

Introduction

Sadly, in many Asian territories there still exists the misconception that in order to handle and control elephants, it is necessary to impose a certain level of firmness, intimidation, and aggressiveness directed towards it. After all, they are big, strong animals with tough skin, and the mahouts are just following common practice and teachings that have passed from generation to generation for many centuries. What is surprising though is that this practice of intimidation has not changed throughout the years despite the long list of injuries and fatalities of mahouts, passersby, and elephants alike, arguably attributed directly to the use of these inadequate and detrimental practices.

Nowadays, the Positive Reinforcement and Protected Contact methods have demonstrated that there are simple and practical ways to handle, train, and provide treatment for animals without the need to cause psychical or psychological harm; however, these methods and techniques are far from being a best-practice standard used around the globe.

Methods

During the last 5 years Africam Safari and The Golden Triangle Asian Elephant Foundation (GTA-EF), through its Anantara Golden Triangle Elephant Camp, have been teaching mahouts from Thailand, Cambodia, Laos, Myanmar and Indonesia how to take better care of their elephants, using safe and non-harmful methods. At the same time, they have trained the elephants to take specific cues and directions from their mahouts so that the elephants collaborate and allow them to provide sanitary and medical care for them, even though they are not being threatened or harmed.

One of the most important parts is to teach the mahouts how to use a “target”, a tool that helps the trainer to move the elephant in different positions just by pointing and without harming the elephants at all. They are not going to force the elephants to do things but convince them to follow their commands voluntarily. The elephants are motivated by receiving sun flower seeds, fruits, or rice as



a positive reinforcement for their achievements instead of using their common tools that the elephants associate with punishment and pain. The other important part of the “target training” is to use “protected contact” by doing the training with a barrier that separates the trainer and the elephant, providing greater security.

Given the circumstances, the Training Program that we implemented had to be quick, convincing, and effective, so that the mahouts could see the progress and allow us to continue working with their elephants, which are their most valuable possession. Even though we brought all our expertise and knowledge, only one thing held it all together, the most simple but the most important rule when it comes to animal training - to be patient.

Results

Our first achievement was to get the mahouts to change the way they do things and embrace a different approach when it comes to handling their elephants. It was not a small task to convince a mahout, whether young or old, that despite what they know and the fact that they have been handling elephants a certain way their whole life, that these are actually ineffective and detrimental handling methods.

Secondly, the mahouts were able to realize that by using Positive Reinforcement they can interact with the elephant and get them to follow direct and new instructions without the need to use harmful ways. Therefore eliminating the risk of accidentally inflicting a serious injury upon the elephant.

Thirdly, they also learned that through the use of Protected Contact they can perform routine procedures like blood samples, mouth inspection, rectal palpation, wound care, and foot care. Foot care is very important because foot problems are very common and very often can compromise the elephant health. All of this exponentially reduces the risks to their person or to any person performing the routine care or a veterinary procedure.

And lastly, we shared with them the importance to reduce the time that the elephants are restrained or kept in an enclosed area without anything to do. By providing them with Occupational Therapy they reduce the elephant’s stress and debilitation while at the same time they are training them to follow their instructions.

Conclusions

The mahouts who took lessons given at the local and international workshops at the school camp and at different locations and countries now can instruct their own elephants to adapt several position by themselves. They can perform several tasks that had never or rarely been performed in the past due to the difficulty in setting up the right conditions and the danger involved in it. They do it all without harming or being aggressive towards the elephants. Both mahouts and elephants are enjoying

their new routines and embracing the use of the Positive Reinforcement, Protected Contact and Occupational Therapy, as a new, better, and safer way to care for and handle the elephants.



A Birds' Eye View- A Breakdown in Relations between Parrot and Caregiver

Elaine Henley

Animal Behavior Clinic

The keeping of parrots as companion pets is rapidly growing in popularity, and they are often perceived to be a pet that is easier to care for than a dog – after all, you don't have to take a parrot for a walk, right? All too often, the purchase of a parrot is an impulsive response to the media's bombardment of the public with images of exceptional parrots -- real or animated—who converse, dance, sing, perform tricks, and relish being petted and snuggled by their caregivers. As a consequence, caregivers' expectations are often raised to unrealistic levels, and disappointment ensues when the reality of parrot keeping does not match caregiver expectations. Many caregivers are disappointed when they have relationship issues with their parrots such as extreme vocalization, handling problems, destruction of property, and aggression directed toward them, the caregiver – the provider of food and adoration.

Parrot caregivers are more likely to tolerate lesser-perceived problems, such as destruction and noise, when they have either formed a tactile bond with their parrot or the parrot's aggression toward them is minimal. Caregivers often approach their relationship with their parrot from a human perspective, rather than from one which is natural to the parrot.

This presentation will explore the differentials for aggression directed toward the caregiver and household members. Information and analyses provided will be comprehensive and include the consideration of parrot ethology and flock behaviour, while emphasizing the need for an individualistic behaviour modification and training resolution.

Lennox & Harrison (2006) suggest that caregivers develop a deep attachment to their parrots. The theory of attachment, developed extensively by Bowlby (1969) and Ainsworth (1989) - has been extended to include pets. The original theory states that humans have an innate need for emotional attachment and they tend to seek out those social bonds. People, as well as becoming attached to other people, can also become emotionally attached to non-human animals and researchers have pointed to this as a source of social support (e.g. Serpell, 2002). In particular, Collis and McNicholas (1998) have argued that pets provide humans with a sense of safety and security. Through this attachment, they can build a relationship with the animal that might not be available with other people.

This view of pets as important for security is also supported by Cusack (1988), particularly as a kind of more socially acceptable 'security blanket'. The pet has the effect of making the owner feel safe while the parent/loved one is away. Not only can pets provide security but also they also provide support or even replace the love they receive from the family or from friends (Okoniewski, 1984).

Often given the term FIDs (feathered kids), parrots are considered by many caregivers to be part of the family, taking part in celebrations such as "hatch-days" (Anderson, 2003). On the flip side, there are increasing numbers of parrots who are being relinquished into rescue organizations (Salman et al., 2000). Aggression, screaming, and feather picking are the most common behavioural problems reported to avian vets (Gaskins & Bergman, 2011). A lack of understanding of parrot behaviour, their communication, and their physiological and social needs may lead to impaired welfare (Anderson, 2014), in terms of both physiological

and psychological wellbeing.

The sense of touch is very important to humans, who may use this for both discrimination and emotionality; we touch to convey feelings of affection (McGlone, F. et al., 2007). According to Keltner (2010), touch is a primary means by which humans communicate compassion to one another and is fundamental for our bonding. Punyanunt-Carter & Wrench, in the first study that considered the effects of touch deprivation in adults, found that touch deprivation decreased humans' self-esteem and increased depression. Similarly, touch is an essential part of the human-non-human relationship (Beck & Katcher, 1996). Reduced blood pressure, heart rate, and respiratory rate were recorded in humans when they petted an unknown cat or dog (Baun et al., 1984).

Touch between conspecifics is important in parrot social relationships and, in particular, between pair bonded individuals (Seibert, 2006). However, most physical contact between adult parrots is for courtship and mating purposes (Van Sant, 2006), although mutual grooming around the head area is often observed among non-pair bonded parrots and juveniles. It is not known if touch deprivation has a significant effect on a parrot's emotional wellbeing, when being kept in captivity and without access to a conspecific or when a touch relationship has not been established between parrot and caregiver.

Parrots in captivity will perform two categories of behaviours: self-maintenance (to maintain physical and emotional well-being) and social behaviour (to convey information to another individual who may be the caregiver, and other humans or animals within the household). Aggressive behaviour can be delivered using a signal to the receiver, which results in a benefit to the sender or a display to convey a specific message. Parrots that have not been habituated to touch by a human from an early age or that have lost their trust in humans are most likely to use both aggressive signals and ritual displays when confronted with the outstretched hand of a human. As a last resort, when both signals and rituals are ignored, the parrot may bite; the outstretched hand is then withdrawn and the parrot quickly learns that biting is a behaviour that works to prevent being handled by a human. Caregivers become distressed when confronted by a biting parrot who they just wish to touch as a means of conveying an emotional bond and/or because they are simply humans being humans. As previously noted, physical contact is a primary manner in which humans communicate and convey affection, and human caregivers of parrots sometimes forget that it is the responsibility of the human to adapt to the world of the parrot, rather than vice versa.

The parrot who does not wish to be touched, cuddled, or handled by the caregiver is often labelled as "mean, vicious, dominant, punishing" (Friedman et al., 2006), or "wanting to burn the world." Although these constructs are unhelpful in understanding why the parrot is biting, their use does inform us of the negative feelings that caregivers have towards their parrots who are biting them. These negative feelings are perhaps intensified when caregivers are bombarded with images of the perfect parrot who understands language and speaks, who is able to perform amazing tricks, and who snuggles and cuddles with caregivers. Caregiver-directed aggression is often cited as one of the reasons for parrot relinquishment to rescue societies (Bird Line, 2015) and for referral to an animal behaviour counsellor (Henley, 2015). One of the most frequent questions asked on Internet forums and Facebook groups are regarding to caregiver-directed aggression. The quality of the advice given on Internet forums and Facebook groups will vary and be dependent on caregivers providing sufficient information with regards to medical history, early rearing environment, history of habituation to humans, learning, training and behavioural history, and the depth of knowledge of the person giving advice. The quality of "professional" advice available may also be questionable with many advising an overuse of negative reinforcement (disguised as positive reinforcement), flooding, and at worst, punitive methods of punishment. Unfortunately, the role of the animal behaviourist/trainer is largely unregulated, and there are concerns that the quality, depth of knowledge and experience of some who are practicing is less than desirable.

Unless working with a parrot on an individual basis, behavioural counsellors must possess excellent interpersonal skills to empower caregivers to make the necessary changes in their own behaviour that will see a decrease in the unwanted behaviour that the parrot is performing. It has been stated that client-therapist relationship is the prime determinant of the outcomes of the therapeutic process (Rogers et al., 1967). Thus, practitioners need to pay attention to what their clients are thinking, feeling, and doing; and a complete therapy must address all of these facets (Corey, 2008). Additionally, counsellors should be culturally

sensitive; in other words, they should have an awareness of the divergence between their worldview and that of their clients (Ponterotto et al., 2001).

The ability to take good history is central to all aspects of counselling, and it can even be argued that it is the most important skill for a counsellor (Bowen & Heath, 2005). Moreover, the questions should be open ended and free of suggestion (Knol, 1993). Hart and his colleagues (2006) stated that it is important for the counsellor to address and explain the aetiology of the problem to the clients, as this might affect their moods and engagement with the process (Forgas, 1999). Campbell (2008) indicated that planning a behavioural modification programme with the clients helps them to feel less anxious about the programme. The ideal approach is to have at least one follow-up or progress check after the initial appointment (Hart et al., 2006). Hart and his colleagues (2006) stated that giving a written copy is very advantageous for the clients, with the particular educational needs of the client in mind.

Differentials for aggression and biting directed towards caregivers and other humans when the parrot is touched may include ill-health, colour of clothing (red is the colour of threat in the wild), light reflection on jewellery or spectacles, lack of appropriate socialization to a range of people and genders, lack of touch/handling habituation while a chick, previous inappropriate training histories or experiences, multiple or single traumatic events, etc. Also included in this list are inappropriate diet, hormonal influences, the parrot has not bonded with the caregiver, environmental stress, genetic influences on behaviour, fear-provoking environment, somebody is performing unreasonable behaviour (from the parrots' view) or the caregiver is performing unreasonable behaviour (from the parrots' view). Many parrots in captivity will have been wild caught and the experience may have been mentally damaging to them (Post Traumatic Stress Disorder, Bradshaw et al., 2009).

The behaviour consultation involves the counsellor considering all appropriate differentials for the unwanted behaviour and then devising a programme appropriate to the needs of both the parrot and caregiver. Each and every parrot's and caregiver's circumstances will be different and individual; therefore, success may be more likely when each is given a unique behaviour modification programme. Client expectations must be managed so that realistic and achievable goals are met. In the case of caregiver directed aggression, it is the counsellor's responsibility to formulate a behaviour modification plan that will improve the trust bond between parrot and human before the actual work of desensitisation and counter conditioning to touch can begin. Whilst this will not replace the caregivers need to touch their parrot, in the short term establishing a "boast" or "brag" (in other words, teaching the caregiver how to teach the parrot a simple trick, such as wave or "high five") can give the caregiver confidence to continue with behaviour modification, but also they can take delight in their companion pet's trick. The more that we teach our caregivers to behave in a clever manner, the more empowered they will feel.

In summary, when faced with parrot aggression, caregivers should realize that many variables have an affect upon the parrot's attitude and behaviour and, therefore, it is essential that clients seek the assistance of a qualified counsellor to provide solutions to their concerns. However, it is especially important that the behavioural counsellor not only be experienced and skilled in his/her profession, but must also be sufficiently sensitive to the needs of both parrot and caregiver to develop a behavioural modification programme that will suffice to achieve the caregiver's goals and attain the most desirable outcome.

References

Ainsworth, M. D. S. (1989). Attachments beyond infancy. *American Psychologist*, 44, (4), 709-716.

Anderson, P. K. (2003). A bird in the house: An anthropological perspective on companion parrots. *Society & Animals* 11: 393-418.

Anderson P.K. (2014) Social dimensions of the human-avian bond: parrots and their persons. *Anthrozoos* Vol 27, issue 3, PP 371-387

Baun, M. M.; Bergstrom, N; Langston, N. F.; Thoma, L. (1984) Physiological Effects of Human/Companion Animal Bonding. *Nursing Research* Vol 33 Issue 3

Beck, A. M. and Katcher, A. H. 1996. Between Pets and People: The Importance of Animal Companionship. Revised edn. West Lafayette, IN: Purdue University Press.

Bowen, J., & Heath, S. (2005). Behaviour problems in small animals: Practical advice for the veterinary team. Philadelphia: Saunders Ltd.

Bowlby, J. (1969). *Attachment* (2nd Edition) New York: Basic Books.

Bradshaw G A, Yenkosky J P, McCarthy E (2009) Avian affective dysregulation: psychiatric models and treatment for parrots in captivity. Published in the proceedings of the 30th Annual Association of Avian Veterinarians Conference

Campbell, W.E. (2008). Dog behaviour problems: The counsellor's handbook. United States: Behavior Systems.

Collis, G. M., & McNicholas, J. (1998). A theoretical basis for health benefits of pet ownership: Attachment versus psychological support. In: C. C. Wilson, & D. C. Turner (Eds.). *Companion animals in human health*. Thousand Oaks, CA: Sage.

Corey, G. (2008). Theory and practice of counselling & psychotherapy. (International Ed.). Belmont: Wadsworth.

Cusack, O. (1988). *Pets and Mental Health*. London: Haworth Press.

Forgas, J.P. (1999). On feeling good and being rude: Affective influences on language use and request formulations. *Journal of Personality and Social Psychology*, 76(6),

Friedman, S. G., Martin, S. and Brinker, B. 2006. Behavior analysis and parrot learning. In *Manual of Parrot Behavior*, 147–163, ed. A. U. Luescher. Oxford: Blackwell Publishing.

Gaskins L.A, and Bergman L. (2011) Surveys of Avian Practitioners and Pet Owners Regarding Common Behavior Problems in Psittacine Birds *Journal of Avian Medicine and Surgery* 25(2):111–118

Hart, B.L., Hart, L.A., & Bain, M. (2006). Canine and feline behavioral therapy. Iowa: Blackwell Publishing.

Keltner D (2010) Hands On Research: The Science of Touch http://greatergood.berkeley.edu/article/item/hands_on_research

Knol, B.W. (1993). A veterinary-ethological approach to problem behaviour in dogs. *Bulletin Veterinary Clinical Ethology*, 1

Lennox A.M., Harrison G.J. (2006) The Companion Bird, *Clinical Avian Medicine* Harrison G.J. and Lightfoot T.L. (Eds.). Publisher: Clinical Avian Medicine (www.clinicalavianmedicine.com/). Internet Publisher: International Veterinary Information Service, Ithaca NY (www.ivis.org), Last updated: 20-Apr-2006; A3805.0406

McGlone, F., Vallbo, A. B., Olausson, H., Loken, L., Wessberg, J., Discriminative touch and emotional touch. *Canadian Journal of Experimental Psychology/Revue canadienne de psychologie expérimentale*, Vol 61(3), 173-183

Okoniewski, L. (1984). A comparison of human-human and human-animal relationships. In: R. K. Anderson,

B. L. Hart & L. A. Hart (Eds.). *The Pet Connection*. Minneapolis: University of Minnesota Press.

Ponterotto, J.G., Casas, J.M., Suzuki, L.A., & Alexander, C.M. (2001). Handbook of multicultural counselling. California: Sage Publications.

Punyanunt-Carter N.M, Wrench J.S Development and validity testing of a measure of touch deprivation. *Human Communication*. A Publication of the Pacific and Asian Communication Association. Vol. 12, No. 1, pp.67 - 76.

Rogers, C.R., Gendlin, E.T., Kiesler, D.J., & Truax, C.B. (1967.). The Therapeutic Relationship and Its Impact: A Study of Psychotherapy with Schizophrenics. Madison: University of Wisconsin Press.

Salman MD, Hutchison J, Ruch-Gallie R, et al. (2000) Behavioral reasons for relinquishment of dogs and cats to 12 shelters. *J Appl Anim Welf Sci*. 2000;3(2): 93–106.

Seibert, L. 2006. Social behavior of Psittacine birds. In *Manual of Parrot Behavior*, 43–48, ed. A. U. Luescher. Oxford: Blackwell Publishing.

Serpell, J. A. (2002). Anthropomorphism and anthropomorphic selection-beyond the “cute response”. *Society and Animals*, 10, 437-453

Van Sant, F. 2006. Problem sexual behaviors of companion parrots. In *Manual of Parrot Behavior*, 233–246, ed. A. U. Luescher. Oxford: Blackwell Publishing.

Seeing the World through Behavior: The Challenges of Using Operant Conditioning to Train Chinchillas to Voluntarily Participate In Educational Programs When There Are More Than 50 Animal Handlers

Christina Lavallee

Zoo Atlanta

Zoo Atlanta has an active education program with over 50 educators trained to handle all the tractable collection. When a new animal is acquired, keepers spend time ensuring the individual will be comfortable in its new role as an animal ambassador. When keepers think the animal is ready, they begin training education staff on proper handling and presentation. In 2012, chinchillas were removed from the collection due to their inability to adapt to the animal ambassador role. In 2014, new chinchillas were acquired. A training program was started with the animals to teach them kenneling and a consistent type of handling, which would empower this normally flighty animal to succeed in its new role. Each animal had their own personality so training progressed quicker with some while others lagged behind.

We selected two individuals to focus on, with an early 2015 goal as a date to begin educator training. In order to minimize stress, trainings were offered two times a day with a maximum of six educators. Keeper staff demonstrated all aspects of the trained behaviors and were present while the educators practiced. When the animals chose not to participate, educators still practiced with empty kennels to develop mechanical skills. In March 2015, these two individuals should be able to go on programs, seeing the world after handler training is completed. The other chinchillas continue to make steady progress and will be able to travel when they are done with training, without additional staff training.

Introduction

Wieland Wildlife Home at Zoo Atlanta houses about 27 species and approximately 40 animal ambassadors in the tractable collection. There are two primary keepers and four cross-trained keepers that are responsible for the day to day activities including: daily husbandry, medical procedures, train and participate in informal animal encounters, and daily shows. In addition, a separate educational staff of over 50 part-time instructors and volunteer docents are trained to handle the animals within this diverse collection.

In 2012, keepers determined that the chinchillas in the collection were unable to adapt to the ambassador animal role and were removed from the collection. This determination was made due to the behavior of the chinchillas when handlers would attempt to remove them from their enclosure for programs. What typically occurred is the animal would avoid being handled by running around the enclosure. These individuals had rehearsed their avoidance techniques so often that they were very good at avoiding human hands. If this technique failed, they would bark at the handler, attempt to bite, and urinate (aiming for the eyes.)

Without the chinchillas, we had a hole in our collection; we didn't have enough mammals to fill education requests. The chinchilla had been in our collection because it fit a wide variety of educational roles, and was easy enough to handle given the wide variety of skill level within the group of instructors. Chinchillas were also the only critically endangered mammal in the tractable collection.

In 2014, four chinchillas, two male and two female, were acquired and began training in their new role. Since the final goal was to have many people handling them, we wrote a training plan that set them up for success. Initially they were all trained to kennel with sessions occurring once a day or as time allowed. When the animal went into the kennel, they received a portion of their daily diet. All of their produce

and pellet were fed to them inside the kennel throughout the day. They were also offered free choice timothy hay in their home enclosure.

Three of the animals spent 30 days in quarantine before coming into the collection. Two of the three, Kechua (a female) and Cusco (a male), were picked up and handled daily during their quarantine period. The idea for trying this method was that they were hopefully still young enough to accept being picked up by humans as a part of their life. We knew the potential risk that daily handling might cause them to shy away from people. It became obvious as soon as they came out of quarantine, that it did have a negative effect on both Cusco and Kechua. Cusco and Kechua didn't mind being touched while in their enclosure, but hid if a keeper attempted to pick one up. Keepers took the opposite approach when the third animal went through quarantine and did not touch her at all. We chose not to do any touch because keepers were not able to offer her food in conjunction with touching due to the rules of interacting with animals while in quarantine. This also had a negative effect, in that Elsa didn't mind people approaching her, but she was very uncomfortable being touched at all. The fourth chinchilla, Walnut, was the offspring of Cusco and Kechua. Kechua was not lactating, so Walnut had to be fed using milk replacer. He went home with keeper staff at night for round the clock feedings. However, during the day, he spent time with her. Since Walnut was hand fed, he was very comfortable being handled for his milk replacer. To complicate matters further, Cusco, Kechua, and Elsa all had to be medicated for a short time in 2014. Both Elsa and Cusco took their medication on food, but Kechua refused and had to be restrained twice a day. Although we limited this negative interaction to only two keepers, she became more wary of human hands than she was before.

The first step of our training plan, as mentioned above, was kennel training. We felt that a solid kenneling behavior was going to be crucial to keep chinchillas comfortable going on programs with so many people. During the initial kennel training period, we experienced limited resources that caused a shift in priorities. In this period, an experienced keeper left the department. With staff time at a premium, we choose two of the four chinchillas to continue daily training sessions. As different personalities emerged, it became clear that the most likely candidates for success were the two males.

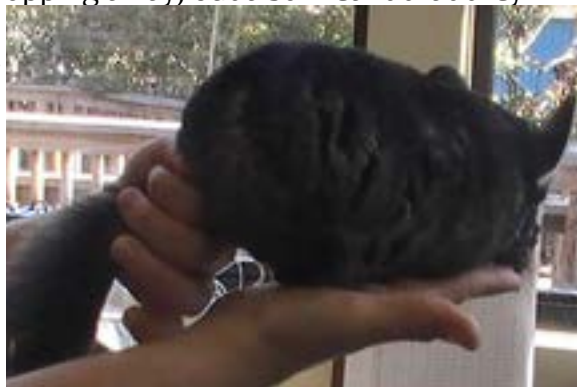
Once Walnut and Cusco were successfully kenneling 2 times a day for all keeper staff, training for educational programs started and was limited to one primary trainer. Initial training began by asking the chinchillas to leave the front of the kennel, by hopping onto a hand. Duration on the hand was slowly built up. Then the chinchillas were asked to remain calm while the trainer approximated a tail grasp at the base, as a precaution against jumping. The trainer approximated duration in the hand with short walks within the room where they were housed.

When the animals were comfortable with the primary trainer, the behavior was passed off to the other keepers. It was noticed at this time that based on the relationship with the trainer, chinchillas were sometimes more likely to jump out of the front of the kennel and hop off, than to hop onto the presented



hand. It was very unlikely that all 50 animal handlers would be able to maintain a relationship with the animals; we knew we had to find another way so we took a step back in their training. We had kennels with two doors, one on the top and one on the front. At this point we began teaching the animals to come out from the top of the kennel, rather than the front. This reduced the chance of them hopping away, but also meant that they would be grasped by the handler and picked up, rather than hopping into the hand on their own.

The primary trainer approximated the grasp using the animals comfort as a guide. When each chinchilla was comfortable with a hand reaching into the kennel, the primary trainer approximated securing the hind end at the base of the tail, supporting the torso, and gently lifting the chinchilla from the kennel. They



adapted to the change well.

Keepers continued to practice the kenneling behavior for about a year before the handlers were introduced in order to create a strong reinforcement history with going into the kennel. This was especially important knowing the number of people that this behavior would be handed off to. As we got closer to passing off the behavior to the handlers, we increased the opportunities for the chinchillas to practice the kenneling behavior. Chinchillas continued to receive all of their chow and produce only inside the kennel with free choice timothy hay offered at home.

To maintain consistency, we only asked the handlers to be able to do four things with the animals. (1) They were trained to ask the animals into a kennel, (2) to pick up the animal through the top of the kennel, (3) return the animal to the kennel, and (4) return the animal to the home enclosure.

In Jan 2015, we began to train the animal handlers on these four behaviors. With over 50 animal handlers, we encountered a variety of skill and experience levels. Some handlers had experience working with the collection's previous chinchillas who had been handled very differently. We had to teach these individuals 'new tricks'. Other handlers, especially the inexperienced or more elderly handlers, were more nervous and not as steady when handling.

We didn't want to see a breakdown in behavior due to the number of handlers, so we limited handler training sessions to one morning and one afternoon session per day with a maximum of three handlers at each session. Handlers were able to sign up for available time slots to include two sessions over the course of 2 months.

During the behavior pass off, the animals were given four attempts to kennel. Although we might not normally have given animals four tries to perform a correct behavior, we felt it was important to give them ample opportunities to succeed due to the variability in handler skill level. The chinchillas were asked to kennel within 3 seconds from the time of kennel presentation, or at the very least, to make contact with the kennel. If any part of the animal was touching the kennel, the kennel would remain until they chose to enter the kennel fully or return to the enclosure. If the animal refused to enter the kennel, the handler would secure the enclosure and return later. During some of the busier training periods, they would sometimes choose to kennel on the second, third, or fourth opportunity. In the rare occasion that neither chinchilla kenneled, we still trained handlers on the mechanics of the kenneling process. Since this was something new to the handlers, keeping the kennel balanced while at an enclosure turned out to be more challenging than we had thought. We did have an increased success rate by giving the chinchillas multiple opportunities to kennel which gave the chinchillas more opportunities to earn reinforcers for kenneling, even when the kennel might not be as steady as it should be.

All of the animal handlers were trained on the chinchillas by the end of February and the chinchillas began getting scheduled for programs in March. Initially the animals and handlers were set up with limited parameters to increase success. The animals were only scheduled for day time programs when keepers were available to assist in kenneling, if needed. After the handlers returned from the program, feedback was gathered on the animals' performance and incorporated into the training log. The animals were assigned alternately, each animal only scheduled six times during the month.

Each month during the year, handlers are required to handle one animal from each handling category for 5 minutes. Many categories contain multiple species and individuals to reduce the monthly time requirement for handlers. Since the chinchillas are a new animal to most of the handlers, they were placed in their own category. We ask handlers to remain familiar with the species by handling one individual monthly. We do this with any new animal in the collection or with protocol changes. One of the challenges encountered is that many handlers will wait until the end of the month to complete their handling requirements. This overload of handlers can, and occasionally has, stressed the animals in the collection. When this happens animals are placed on STOP, communicating to the animal handlers that the animal can no longer be handled for that day. At the end of February, there were still a number of handlers who needed to complete their second training with the chinchilla and keepers, as well as many handlers who had completed their training in January and needed to handle the chinchillas for February requirements. With so many people waiting until the last week of February to complete these tasks, the chinchillas were not interested in kenneling by the end of the month and for a few days at the beginning of March. We had

expressed to the handlers that this was likely to happen. Once they saw it for themselves, by the end of March, most handlers had spaced out their visit. Some handlers had still waited until the last minute, so the chinchillas were placed on STOP after the first three handlers in a day and the behavior is more consistent as a result.

MONTH of January

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	3 2:00 TACOR	6 9:30 TACOR 9:50 Alex Hume	7 9:30 Alex Hume	8 1:30 Megan C 11:00 Natalie 2 3:50 Binger	9 9:30 TACOR 10:00 TACOR	10 9:45 Brian Bitt
11 10:00 Brian Bitt	12 9:45 TACOR 11:30 Natalie	13 10:30 TACOR 2:00 Brian C	14 10:00 Todd 10:30 K. W. W. W. 10:30 Sharon	15 10:30 Melissa King 10:30 Natalie D. P. 1:00 - Chris	16 11:00 - Stephen J. 1:00 - Emily 10:00 - Chris	17 10:00 - Emily 10:00 - Chris 10:00 - Chris
18 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	19 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	20 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	21 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	22 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	23 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	24 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.
25 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	26 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	27 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	28 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	29 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	30 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.	31 10:00 Sharon 10:00 - Y. W. W. 10:00 - Y. W. W.

*Sign up for 1 or 2 days in Jan. Please list time you are coming in, only 3 people before noon and 3 after 4pm. If you get cleaned in Jan please handle in Feb for monthly requirements. M.F. times are between 9:15-10 and 1:30-3:45 Sat/Sun times available are between 9:00 and 10:50 and 2:45 and 3:45

Chinchilla Handling

Conclusion

The males, Walnut and Cusco, are going on programs and we have received great feedback from both the handlers and the guests. Currently, they are presented in the hand in close proximity to guests. As we receive feedback from the handlers that indicate the chinchillas have become completely comfortable on program, they will become an animal that guests can touch. Training with Elsa and Kechua continues as time allows. Both continue to kennel two times a day for all of their produce and chow. Elsa kennels quickly and sits on the hand of the primary trainer when she comes out of the front of the kennel. She still appears uncomfortable with most tactile including tail touching. Keepers have begun approximating tail touch while she is at home so that any negative experiences early on will not be associated the kennel. Kechua is slightly less reliable going into the kennel but, she is gradually becoming more comfortable around the hands of keepers. Even though we still have limited resources, especially time and an empty keeper position, we are confident that at least one of the females will be comfortable to go on programs by the end of the year.

Let's Get Physical

Valerie J Hare and Mark Kingston Jones

The Shape of Enrichment, Inc.

Environmental enrichment, as a concept, is now well recognized as an important consideration in the welfare status of any captive animal. The behavioral, psychological, and physical benefits of enrichment are well documented.

Since the early days of enrichment, many have touted its benefits for physical health, usually through increased activity. While surely beneficial, we believe that the more common enrichment strategies used to encourage activity today do not provide the animals with opportunities for appropriate types or sufficient levels of exercise.

We have an ethical responsibility to provide all animals in our care with good physical, psychological, and behavioral health but also with good physical fitness. And for animals destined for reintroduction, it is imperative that each animal possesses the requisite strength, sense of balance, and fine motor control to survive and succeed on its own.

Thus, we propose that animal enrichment programs include strategies designed to address these needs and we will present examples of such. But, as with all enrichment, we encourage animal care professionals to continue to develop new strategies geared toward providing opportunities for appropriate types and levels of exercise.

Behavioral Management of Welfare through Enrichment

At The Shape of Enrichment, we consider enrichment a beneficial tool to enhance three aspects of welfare: Mental Health, Behavioral Health, and Physical Health and Fitness. This paper will focus on the third, specifically Physical Fitness.

Many animal professionals routinely use body scoring to assess an animal's physical condition. In many zoos, the focus seems to be on preventing obesity or emaciation. We would like to expand that focus to include the animal's actual state of fitness.

Physical Health ≠ Physical Fitness

The World Health Organization (1948) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” – a definition that has not changed since 1948.

Fitness can be described as “A measure of the body's ability to function efficiently and effectively in work and leisure activities, resist hypokinetic diseases (diseases from sedentary lifestyles), and to meet emergency situations” (Buitlean, 2013).

An animal can be healthy – be an appropriate weight; disease, parasite, and injury free; have good dentition; and so on – but not physically fit. In fact, many zoo animals in developed countries like the U.S.A seem to be in this condition. Figure 1 shows a tiger pulling against a garage door spring. The tiger is in good health, but it is easy to see that he lacks musculature in his fore and hind legs. Further, most large cats bre-

athe heavily, some even lay down, after just a few minutes of pulling.

The good health these animals enjoy is a testament to quality veterinary care. However, many of these animals are not agile or strong enough to even remotely exhibit the abilities of their wild counterparts.

Enrichment Goals to Promote Physical Health and Fitness

Our general enrichment goal is to encourage appropriate types and levels of activity. Specific goals focus on agility (hone balance and fine motor control) and strength and stamina (promote muscle, bone, organ, and soft tissue health).

Current enrichment efforts to promote agility include such examples such as see saws, swings, logs, and tubes on ground. Current strength and stamina examples include such activities as chasing toys, moving heavy objects, digging, and climbing. These are all excellent; we applaud these efforts and encourage their continued use.

However, it's important to ask ourselves "How much benefit are they really getting from these enrichment strategies? Are they developing sufficient fine motor control and balance? Are they building sufficiently strong muscles, ligaments, and skeletons? Are their stamina levels appropriate?"

We think we can do better! The following are some non-food and food enrichment strategies that we feel better meet our agility, strength, and stamina goals.

Non-Food Enrichment Strategies

Tug of War

Large hessian (burlap) sacks stuffed with straw or leaves are great for encouraging tug of wars among cage mates (e.g., a pride of lions; Fig. 2) or between neighbors. For example, in our Tbilisi Zoo, Georgia workshop, one hessian sack was placed inside the adult jaguar enclosure another inside their one-year old cubs' enclosure about 10 meters away. The sacks were attached to a rope so that when one was manipulated, the other moved.



Figure 2



Figure 3

Weight "Lifting"

An existing log in a Lory Park Zoo, South Africa, lion enclosure was about 2 feet in diameter and estimated to weigh over 200 kg. The adult lions were not seen interacting with this log. To encourage interaction, the workshop's Lion Group attached the hide of an antelope to the log, with the leg skins hanging loose. The adult male was immediately interested in this and grabbing the leg skins, dragged it all around the enclosure (Fig. 3). This lasted for about 40 minutes, until the hide came off.

Garage Door Spring

Since it was first developed in 1997, the authors have used the garage door spring setup shown in Figure 1 for many individuals and several species, primarily large carnivores.



Figure 4

There are many types of springs available for purchase in do-it-yourself stores but there is one in particular we recommend, especially for stronger animals like the large cats, bears, and apes. This spring, called an overhead torsion spring, can be found in varying lengths and diameters (resulting in different load capacities) but all have (1) safety rods inside that stop the spring from extending beyond twice its resting length and (2) flat metal plates finished on the ends to enable quick, strong attachment (Fig. 4).

For safety, it is imperative that the animal cannot directly access the spring. This can be accomplished by covering the spring for twice its extended length (with PVC, fire hose, etc.) or mounting it outside the enclosure. The second is actually our preferred method as it allows staff to readily move the spring from one enclosure to another.

Once the spring is safely anchored, an interface (the part the animal will touch) must be designed. With carnivores, the preferred interface is a large hessian sack stuffed with leaves or straw – most carnivores just can't seem to resist this! For large apes, we have used either knotted rope or fire hose to give them a good grip.

Rope Branches

Using ropes for perching provides movement for the animal to practice balance, flying or leaping competence, and fine motor control. For example, a horizontal rope was added to a barn owl enclosure in our Djurpark, Sweden workshop. The first owl to land on the rope spent nearly 1.5 minutes using its wings to try to get and keep its balance (Fig. 5).



Figure 5



Figure 6

Artificial Forest

We have created many "artificial rainforests" in various Shape of Enrichment Workshops – the first in 2002, at Porto Alegre Zoo, Brazil. Figure 6 is from an artificial rainforest in a large blue and gold macaw aviary in Ragunan Zoo, Jakarta, Indonesia. Hales (2014) shows a smaller, indoor example for a cockatoo in Raystede Centre for Animal Welfare, U.K.

The artificial rainforest is a system of ropes used to: (a) provide obstacles for flying animals to maneuver among, simulating flying through a forest; (b) create innumerable, dynamic horizontal and vertical landing options for both flighted and non-flighted individuals; and (c) provide numerous, easy-to-fill feeding opportunities throughout the "forest".

The system is created by first installing ropes, branches, or poles horizontally across all or all of the enclosure. Recommended spacing is about two meters apart, although this (as with all the dimensions given) must be adjusted to be appropriate for each enclosure. The horizontal supports should be placed at a height above the keepers' heads but not at the top of the aviary – this allows space for unimpeded flight above the "forest".

Multiple ropes are then hung from these horizontal supports, preferably by splicing but they can also be tied or wired on. Ideally, these would be spaced far enough apart that the animals and keepers can easily move between them but close enough together so that the birds cannot fly between without either slightly tipping their bodies or pulling in their wings. The position of the ropes should be staggered from one horizontal support to the next, rather than lined up.

Perches, swings, hammocks, platforms, ladders, ropes, etc. can be used to connect one or more vertical ropes. But be sure not to significantly reduce the flying options or keeper access.

To prevent the vertical ropes from fraying, they should be finished at the bottom, either with a back splice, a barrel knot, or other large knot. If desired, weights can be added to the bottom to prevent the animals from lifting the ropes and becoming entangled.

For safety, it is imperative that the proper rope be used! Rope safety is a controversial subject – and rightly so. But when care is taken to prevent the animals' limbs, head, etc. from becoming entrapped or entangled and the fibers from being ingested, ropes have been used without incident. Our recommended rope for the large birds and fruit bats is natural fiber rope that is a minimum of about 2 inches in diameter. This rope is commonly used on boats and can be found at shops offering marine supplies. It is expensive, and you will need quite a bit. But once installed it can last for many years, even in tropical climates. For smaller animals, you can save some money using thinner ropes but make sure it is thick and stiff enough that the animals cannot create enough slack to become entangled. Weighting the bottom of the ropes will help.

Finally, feeding options (and novel objects, nesting material, etc.) can be added to the vertical ropes. Various puzzle feeders can be wired or tied onto the ropes. But, if you use thick, stiff marine rope, you can simply untwist the rope, place feeders or food directly inside the rope strands and let go. The rope will naturally spring back into shape trapping the food in place. We strongly recommend that all food and feeders be positioned within reach (without ladders!) of the shortest keeper in the area – that ensures replenishing will be quick and easy!

All in all, this artificial forest approximately the animals' experience of flying or climbing through (or above) a moderately dense forest, landing on any of the moveable branches (aka vertical ropes), and moving among those branches to find and eat their food.

Firehose Net (Fig. 7)

Many people use fire hose hammocks and nets as enclosure furniture. During a Shape Workshop in Sai Gon Zoo, Vietnam, we created a large-weave net (open spaces approximately 1m×1m) to provide physical challenges to a group of silver langurs. Hung at a 45° angle it moved and flexed differently to everything else they had in the enclosure. The youngsters particularly struggled to climb up and down it but persisted and eventually a few little ones started to use it as a slide, climbing up and then zipping back down the slippery surface (See Jones, 2014a).



Figure 7

Age Factor

Starting from a young age is central to the appropriate development of muscle, bone, balance, and coordination. As an example of this two clouded leopard cubs arrived at a collection after being hand reared for the first 6 months of their lives. When they began to explore their new enclosure, made up of a complex, static branching system, they did not have the balance and coordination clouded leopards are famous for – they slipped and lost their balance repeatedly as they tried to make their way around the branches.

Cubs that are parent reared in these enclosures are able to move around the structures well at 3 months old, attaining full competence by age 6 months. Some cubs at this age have been seen climbing vertically up the chain link mesh and upside-down along the underside of the roof – 25 feet above the ground.

Dynamic Branches

A way of making enclosures even more challenging is to replace and add to static branches with a connected system of branching that is suspended so that it moves and sways as the animals climb over it developing muscles and coordination even further. Hales (2013a) described a system of suspended bran-



Figure 8

ches for an Indian desert cat (Fig. 8) and prepared a video detailing the construction process for this dynamic branch system (2011).

For animals that have not experienced these moving structures before, it is common to see hesitation or stronger neophobic responses when they first start to interact with them. For example, at our 2012 Enrichment Workshop in Paulínia Zoo, Brazil, the coati was frightened the first time he stepped on a branch with a lot of movement – he immediately ran to the ground and began manipulating a feeder there. But within a few minutes, he was back up on the moving branches, exploring a variety of feeders and novel objects (see Hales, 2012).

Like the coati in Paulínia, most animals become accustomed to the movement quickly but our advice would be to limit the movement initially. Once the animal is able to deal with it competently, slowly increase the challenge until it is proficient.

Case Study: Rehabilitated Black Kites

Developing strength and balance is critical for animals destined for release into the wild. Deb Ng (2013), of Kadoorie Farms in Hong Kong was concerned that none of their five rescued black kites would be eligible for release even though their injuries were healed. Although they were in a large, high flight aviary, they rarely attempted flight. When they did, they panted heavily after even short flights and their landings were rough, often landing on the ground.

After some brainstorming, the placement (height and distance) and type of the perches were identified as potential problems. The corner perches on either end were high, which was appropriate for fully flighted birds but were difficult for the recovering birds to access. As these perches were all of the same diameter and texture, they did not provide grip options. Also, there were only two perches located between the end perches, the distance between perching was too far for these birds. Finally, the interior perches were low, made of smooth metal, and too short for the birds to land on with their wings extended while avoiding the vertical post.

Each of these identified problems was fixed, allowing the birds easier access and a better grip on all perches. The intermediate perches, which were now usable, allowed them to start with short flights to build strength and confidence before attempting to fly from end to end.

With no other changes made, 14 months after the initial brainstorming session, three of these kites were released and staff were hopeful the other two would be ready for release soon (Ng, 2014).

Food Enrichment Strategies – No More Free Lunches!

Currently, food enrichment strategies are often geared towards increasing foraging time, such as scattering the daily diet under piles of straw for baboons at Lisbon Zoo, Portugal (Fig. 9). For many species, occupying their time with foraging behavior is a critically important objective! However, we question how much exercise occurs with such feeding strategies.

We can utilize feeding techniques to encourage captive animals to not only extend their foraging time but also to exercise while finding, obtaining, and processing their food as their wild counterparts do. Examples of some of the behaviors (stretch, balance, jump, climb, and pull) we want to encourage are given.



Figure 9

Hanging Food

Once a rope or cable is placed out of reach across a hoofstock enclosure, there are many options for hanging food. In the Tbilisi Zoo, Georgia workshop, the goat group suspended several woven browse



Figure 10



Figure 11

balls on a single long rope. The browse balls were high enough that the goats had to rise up on their hind legs to reach them. And, as some of the goats nibbled at one browse ball, the remainder would bounce, making it more difficult for other goats to reach (Fig. 10). For a similar example with deer from our workshop at Sai Gon Zoo, Vietnam, see Jones (2014b).

Also in the Tbilisi workshop, the bear group created a barrel feeder from a large plastic barrel for a pair of European brown bears. To increase the difficulty and encourage stretching and physical exercise, the barrel was “spitted” on a pipe that was chained to the inside of the enclosure bars. To obtain the fruit in the barrel, the bears had to stand bipedal and spin the barrel with their paws, causing the food to fall out of the holes (Fig. 11).

Swinging Food Platform

In the Pretoria National Zoological Gardens, South Africa, a wooden platform was suspended about two feet off the ground by a wire cable at each of the four corners. The leopard’s meat was skewered and attached to a bungee cord directly above the platform. The leopard had to stand up on the moving platform, grab the meat, and hold onto it while removing it from the skewer (Fig. 12 and Hales, 2013b).

Trebouchet (Fig. 13)

Keepers at The Wildwood Trust in the U.K. have created a simple system for their lynx where a wooden arm can be dropped down to be loaded with meat and then easily raised up and secured. This requires the lynx to leap up around 10 feet up in the air to grab their food (Hales, 2015).



Figure 12



Figure 13



Figure 14

Cagetop Feeder (Fig. 14)

At Kaunas Zoo, Lithuania, they have a tree trunk suspended from a metal bracket, which has a metal box at the top. The meat is placed in the box and the snow leopards must climb the pole to reach the box and extract the meat through the hole.

Feeder Log on Bungee

Chris Hales suspended a vertical log with bungee cord as a feeder for margays at Port Lympne Reserve, U.K. The lowest part of the log is accessible to the cat if it stands bipedal. Chunks of food were wedged in the holes. The cat has to climb or jump onto the log, pull the food out (which requires significant effort), and jump down before it can eat (Fig. 15).

Pulley Feeder (Fig. 16)

Keepers at Port Lympne Reserve, U.K., used a reverse zip line design to promote cooperative physical exercise for their African hunting dogs. Set on a hillside enclosure, the meat is attached to a track runner and when resting at the bottom of the slope it is out of reach of the pack. A strip of fire hose dangling from the runner must be used to drag the meat back up the hill, pull it down, and hold it in place while others feed.



Figure 15



Figure 16

Garage Door Spring

The garage door spring set-up shown in Figures 1 and 4 can also be used as a feeder. However, do not place the food inside hessian or other material that will absorb the scent and juice of the meat. Rather use wire, cable, metal rods, etc. to safely attach the meat (Hare and Jarand, 1998).

Physical Health & Fitness Chart

One way to remember that behavior is just the start of what we are trying to achieve with enrichment aimed at improving physical fitness is detailed in a chart devised by Chris Hales (Fig. 17).

As with all goal-based enrichment, we start by researching the animal's natural behavior and coming up with an appropriate activity. For example, we initially place the food low on a big cat pole feeder, knowing that this activity works the muscles, which in turn develops the cat's balance, coordination and strength.

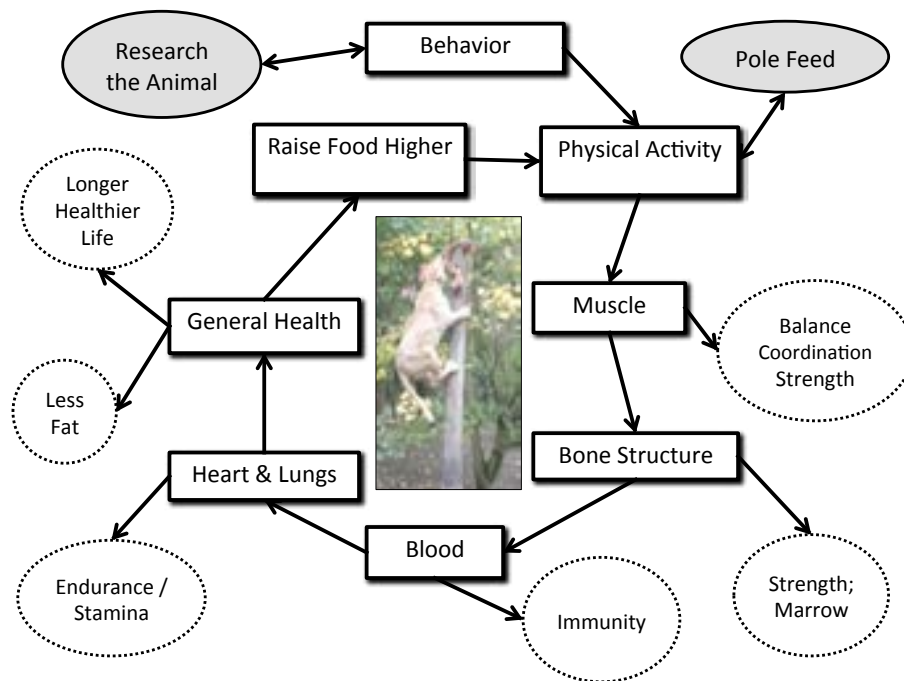
What is often forgotten is that the bones are also being worked and strengthened, as skeletons are routinely being broken down and rebuilt. Also, developing is the bone marrow where blood cells are produced, including many of the white blood cells needed to fight disease and develop immunity.

The circulatory and respiratory systems are also stimulated, making them stronger and leading to increased endurance and stamina.

Overall this enrichment strategy should lead to less fats and a generally healthier, and possibly longer, life.

As the cat becomes proficient, thus experiencing less of a physical challenge, we can increase the difficulty by raising the food to a higher position – and the process continues.

Evidence of this process is supported by the post mortems of two Sumatran tigers, which used pole feeders from a young age on a regular basis. When these animals died at the age of 14 from accidental barbiturate poisoning, their skeletons were free from arthritis – unlike other captive cats of a similar age, which can start to develop arthritis at the age of 6 years (Kitchener, 2004; O'Regan and Kitchener, 2005).



Case Study – Tiger Feed Pole

A female tiger had great difficulty climbing to the top of a new feeder pole and was not able to descend safely – she would drop from about four meters high. Because her legs could not support her, her chest and abdomen struck the ground hard upon landing. Clearly, this tiger was not up to performing this task safely.

The solution was to mount the food lower at a height she could safely reach and descend – just over 2 meters. A plan was developed so that over time, the food would be raised in increments until she was able to safely climb to and descend from the top of the pole. The amount of time the food was offered at each lower lever was determined by her ability and development.

When I visited this zoo 4 years later, I observed her easily climbing all the way to the top and then climbing all the way down! The keepers said this required about a year to achieve.

Conclusion

Enrichment aimed toward increasing physical health and fitness should be provided for all the animals in our collections. As animal caretakers, we must regularly re-evaluate the physical, mental, and behavioral challenges we provide our animals to ensure we are managing their behavior to achieve optimal welfare.

Remember, we want to encourage animals to accept physical challenges. But we must not ask an animal to perform beyond its current ability level. Rather than “push” them into tasks too challenging, we can encourage them to develop at their own pace.

Our Challenge to You

Create and test new enrichment strategies designed to increase physical health and fitness for the animals in your care. And then share them with us through conferences and publications such as The

References

Builtlean. 2013. www.builtlean.com.

Hales, Chris. 2015. <https://www.youtube.com/watch?v=cvupa2Koi7o>

Hales, Chris. 2014. <https://www.facebook.com/EnrichmentShapeUKandIreland/videos/vb.185861671462824/795653907150261/?type=1&theater> (artificial forest begins at 1 minute 36 seconds).

Hales, Chris. 2013a. Dynamic Branches. *The Shape of Enrichment* 22(4): 1-3.

Hales, Chris. 2013b. <https://www.facebook.com/EnrichmentShapeUKandIreland/videos/vb.185861671462824/796394230409562/?type=1&theater>.

Hales, Chris. 2012. https://www.youtube.com/watch?v=bR_xE2ND634.

Hales, Chris. 2011. <https://www.youtube.com/watch?v=bH01PjotQ-4>.

Hare, Valerie and Jarald, Paul. 1998. Artificial Prey that Fights Back (and Other Tales of Tiger Enrichment). *The Shape of Enrichment*, 7(3); 1-4.

Jones, Mark Kingston. 2014a. <https://www.facebook.com/shapeofenrichment/videos/vb.143901003825/10152647831463826/?type=1&theater>.

Jones, Mark Kingston. 2014b. <https://www.facebook.com/shapeofenrichment/videos/vb.143901003825/10152647863683826/?type=1&theater>.

Kitchener, A.C. 2004. Problems with old bears in zoos. *International Zoo News*, 51, 282–293.

O'Regan, H. J. and Kitchener, A. C. 2005. The effects of captivity on the morphology of captive, domesticated and feral mammals. *Mammal Review*, 35(3-4), 215-230.

Ng, D. 2014. Personal Communication.

Ng, D. 2013. Personal Communication.

World Health Organization. 1948. <http://www.who.int/about/definition/en/print.html>.

Decreasing Different Kinds of Aggression Using the “Stress Triangle”

1) František Šusta 2) Gabrielle Harris

1) Prague Zoo, Czech Republic 2) South African Association for Marine Biological Research, RSA

In 2014 we published the “Stress Triangle – The Four Questions for Which Animals Need an Answer” (Wellspring 14/2). This system, which protects the trained subject from distress during the training process, is relevant not only when desensitizing subjects to ‘scary’ things, but also in a wide application of positive reinforcement training situations. In summary; the animal needs to have answers to four standard questions to ensure that their learning remains choice-based. This prevents them from becoming distressed. The questions are; 1.WHY do I participate in the training? 2. How can I STOP the training from happening? 3. Where is my SAFE PLACE to relax? and 4. How can I show the trainer I am ready to START work in the training session?

During the last year this system has been used to diagnose different causes of aggression in a variety of exotic and domestic animals. It has assisted to find appropriate solutions. We have found that the kind of aggression that we are dealing with influences the design of the solution process. In the paper we present different case histories where there have been different motivations for the aggression and illustrate how we used the stress triangle to diagnose the concerns. We will outline solutions that were implemented. Types of aggression we will look at include fear, defensive, predatory, and learned. In conclusion we will discuss how aggression can be the result of the inappropriate use of a schedule for reinforcement.

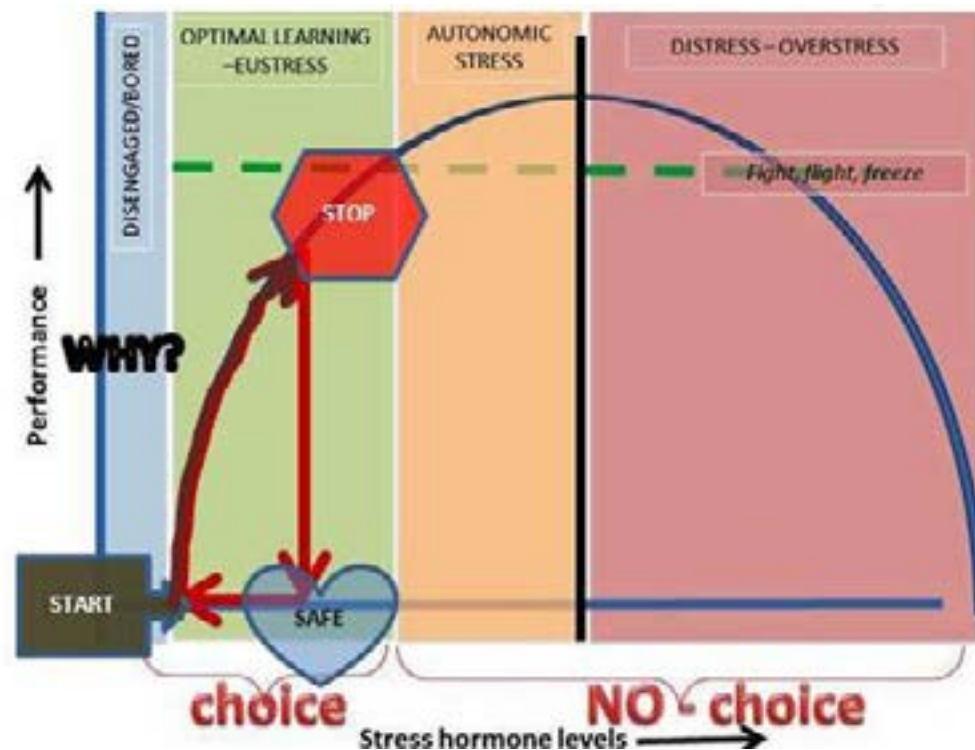
INTRODUCTION

In 2014, we published our system that we use to maintain choice-based learning for animals. This was done in the “Stress Triangle – The Four Questions for Which Animals Need an Answer” (Wellspring 14/2). Among other benefits, this system has been used to diagnose different causes of aggression in a variety of exotic and domestic animals. It has assisted in finding appropriate solutions.

In this paper, we summarize the ‘stress triangle’. We then outline different cases with examples, where there have been different motivations for the aggression and illustrate how the stress triangle is used to diagnose the concerns. We will outline solutions that were implemented. In conclusion, we will discuss how aggression can be the result of an inappropriate use of a schedule for reinforcement.

SUMMARY OF STRESS TRIANGLE

The stress triangle illustrates how distressful learning can be avoided. In order for this to occur, the animal needs to have answers to four standard questions to ensure that their learning remains choice-based. This prevents them from becoming distressed. The questions are: 1.WHY do I participate in the training? 2. How can I STOP the training from happening? 3. Where is my SAFE PLACE to relax? 4. How can I show the trainer I am ready to START work in the training session? When these questions are answered, the animal’s stress hormones do not accumulate to the point of distress. Learning is successful and the animal’s stress hormone accumulation immediately returns to normal upon success. If one or more of the questions is not answered, the stress hormones continue to accumulate until they reach a tipping point, which is where the animal either becomes reactive or distressed. In the reactive phase, learning is very powerful, but not choice-based. Furthermore, the animal can easily enter the distress phase when in this high stress phase. In distress, the animal can suffer acute or chronic illness or death. For each animal, whe-



Pic1

re this distress begins, is different. (Pic1)

REACTIVE PHASE AND CLASSICAL CONDITIONING

Why is the reactive phase not choice-based? This is because learning in this section of the stress triangle is classically conditioned. When stress hormones are piqued, the animal's survival mechanisms take over in the autonomic nervous system. This reaction occurs because one of the primary requirements that enable a sense of well-being in the animal has been removed. This primary requirement is a need to be secure or in control. Being in control effectively satisfies a biological need, and thus is a primary reinforcer. The animal becomes reactive in order to resume control or perceived control over its environment. So, for example, it aggresses. This results in the threat being removed. This response is classically conditioned because the control or perceived control is associated with the aggression. Retraining animals that have succeeded with aggression is very difficult. The reinforcement history now includes survival tactics that have been classically conditioned. The cue to that aggression will be well entrenched.

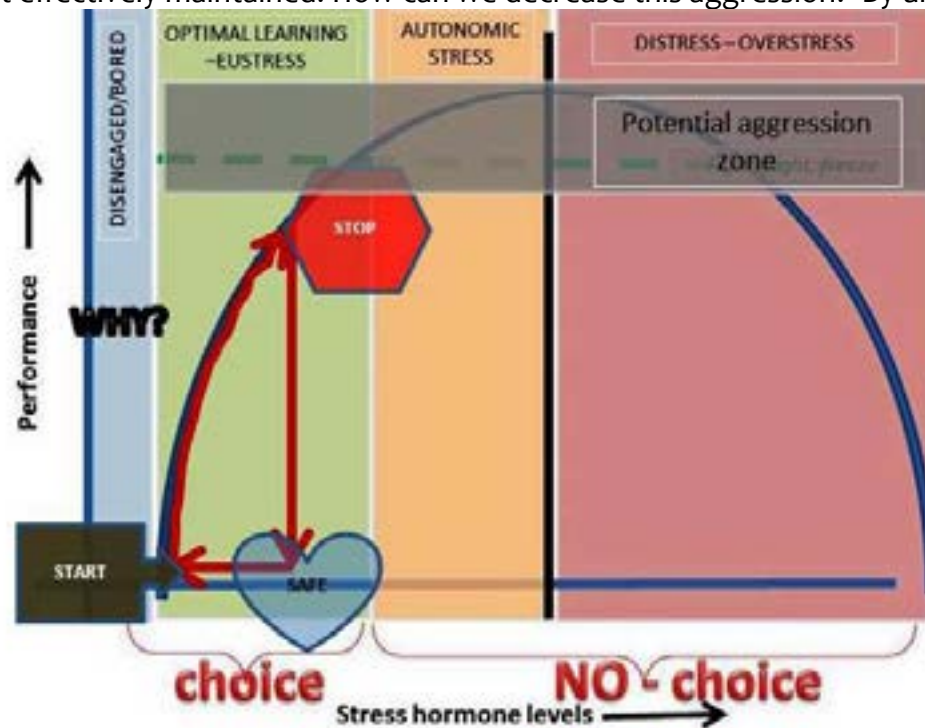
WHAT IS AGGRESSION

Definitions of aggression vary. Usually aggression noted in the animal, is seen to be associated with high energy and stress. The animal becomes reactive as a result of its choice being taken away. Choice implies control, and perceived control in any organism's perception is primary in that it is associated with survival. When an organism becomes reactive and aggresses towards another as a result of losing control or choice – as we note in the triangle, this is what we term aggression.

AGGRESSION AND THE STRESS TRIANGLE (Pic 2)

So, according to this concept, we can see that reactive aggression, takes place around the top of the "stress hill" above the Fight, Flight or Freeze line when the animal has lost voluntary control – they are simply being "instinctive". Some aggression is done voluntarily, but because of the necessity of the high energy, the animal is still very near this line. Chances are that when the animal is choosing aggression in a voluntary state, they have learned that they can succeed to re-establish their sense of control with this aggressive behavior. This begs the question, how can the internal state of animal move to the point where the aggression can happen? We propose that this occurs when the balance requirement achieved with the

four questions is not effectively maintained. How can we decrease this aggression? By understanding whe-



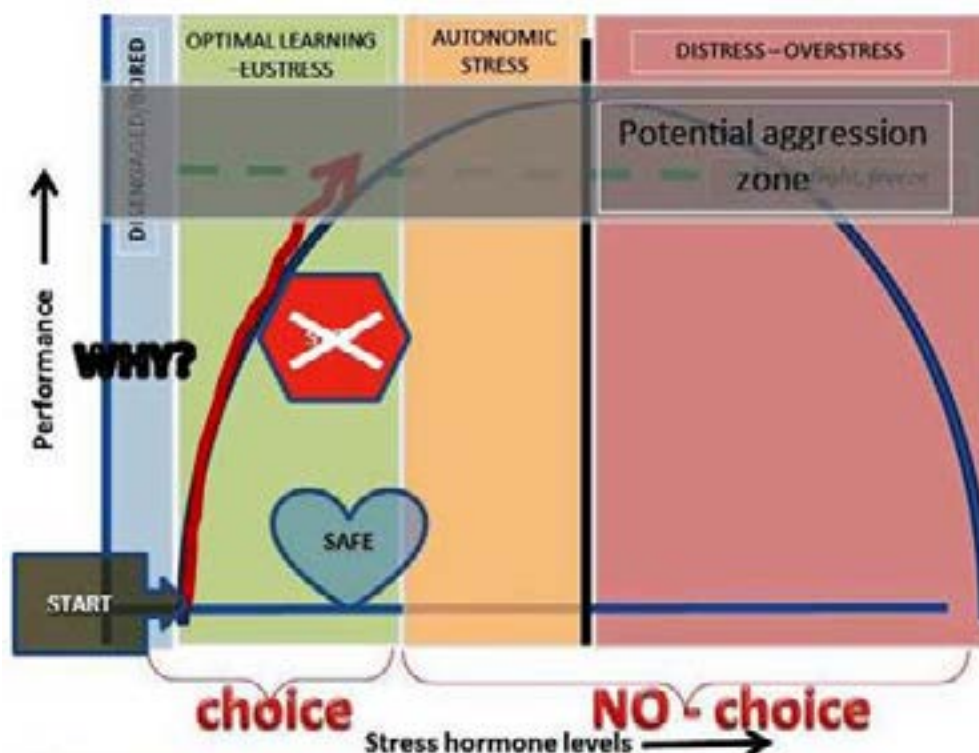
Pic 2

re the balance was broken and by reestablishing this balance in the system once again.

DIFFERENT SCENARIOS THAT CAUSE AGGRESSION OUTLINED IN STRESS TRIANGLE

Here is an outline of what occurs in the stress triangle when different questions are not answered, and how this results in aggression.

1) Aggression when an answer is missing:



Pic 3

1a) When STOP is missing (Pic3):

What will happen if the animal cannot answer “How can I STOP the training from happening?” Just have a look at picture 3. Without the choice to STOP the training, the possibility exists that – even though we are not aware of the stress the animal is experiencing, it is occurring. Learning has proven to be stressful. Without escape, the animal will easily cross the FFF line and the aggression (Fight) is one of these only remaining choices.

Imagine the situation of the dog on a leash during training, and it is being threatened by another dog. We expect the dog in training to stay attentive to the training. However he cannot get away from his perceived threat. So eventually he will pull away from us, or redirect on us, or if in close proximity to the other dog, start a fight.

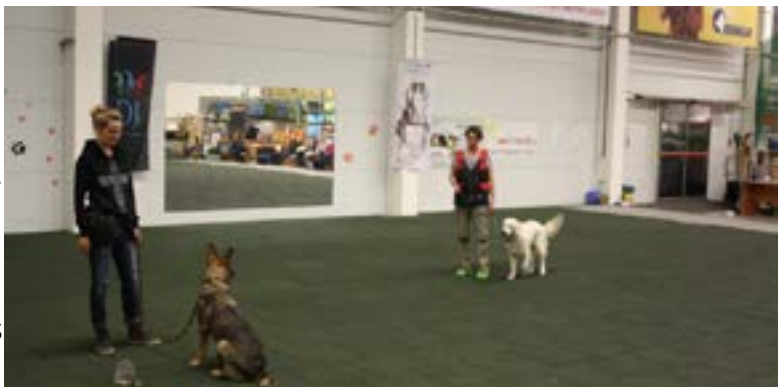
To reestablish the stress triangle back and put the system back to balance we use the training described in article SUSTA, HARRIS, SULLIVAN, 2014: “Stress Triangle – The Four Questions for Which Animals Need an Answer” Wellspring 14/2. The training goes like this:

Pic 4 - Our reactive dog stays on-leash and he is bridged and reinforced just for sitting and looking at his trainer (without any verbal cue). This relaxed “sit and look” is an indicator of low stress and indicates to us the answer for “START”. The rewards the trainer provides are the answer for “WHY”.



Pic4

Pic 5 - Next, another dog on-leash begins to approach our dog. Our dog looks at him and at the same moment the other dog stops. The action of looking at the other dog is the answer for “STOP”.



Pic5

Pic 6 - After our dog stops this approaching stressor in this way, he then looks back to the trainer who immediately bridges and reinforces with a food reward. Additionally, at the same moment, the other dog decides to move further away. This action of decreasing proximity leads to decreased stress in our dog. This adds not only to our reward but also provides an answer for the final question “SAFE PLACE” (near/ trainer, far from other dogs). After relaxing in this “SAFE PLACE”, our dog looks at the trainer (START) and the process can start again. Through this experience and with a few repetitions, our dog learns that he does not need to use aggression to stop the approaching dog (stressor). Likewise, we do not need to decrease the proximity of both dogs as a part of the reward. When the trainer notices that his dog is looking at the other animal he stops approaching. Finally, there is no need to stop at



Pic6

all because our dog has become desensitized to other dogs. We can then simply go on with counter-conditioning because our dog’s stress does not go above the FFF line in the presence of the other dogs, which then negates the need to use the inappropriate “answers” our dog used previously to reduce stress. (Pic 7,

Pic 8)



Pic 7



Pic 8

1b) When STOP has been punished

Another situation is, when STOP is possible, but the animal has historically been punished for that response. So it does not choose the STOP for fear of the punisher, and as a result, the stress level, exceeds the FFF line. This again, is typical in the dog world, where some growling and other evident precursors are commonly punished in traditional training. The dog then internalizes the stress and eventually crosses into the reactive phase. We notice aggression, and it appears to us as though there was no reason or warning, because there was no precursor.

Animals like this will probably not calmly ask for STOP because of the pure history so it is very important to teach him the signal “I am prepared” resp. “I know what is coming and I can do it.” The example is dog Fido, who we taught a signal “waving his paw” as an agreement for events he was originally afraid of. For example Fido is showing strong aggression without any precursor when seeing movement of scrub. Far from this scrub, where stress is low, we can teach him “waving the paw” as a signal “I want to work” (answer for start). Then we can go near the scrub, show it to him without stressing movement. If he waves the paw as the answer, this is a little information he has prepared for an originally stressing event. Of course we will not move it to much, but only a little, not to betray his agreement and the trust we build now. During the training session the movement is bigger and bigger and before each movement of the scrub, so before each originally stressing event, we will show him what is going to happen and wait for his answer – the agreement expressed but waving the paw. (Pic. 9)



Pic. 9

1c) When SAFE PLACE is missing

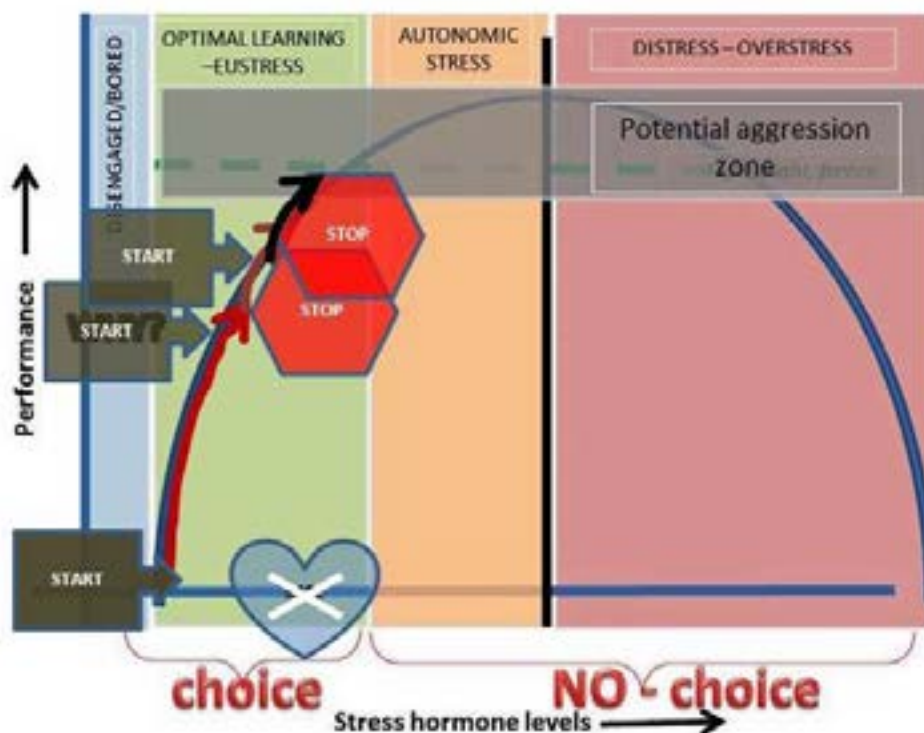
(Pic. 10)

The safe place can be a real place, for example with the trainer, or in a crate. So when in a new environment for example, when the animal is stressed, it can head back to its crate at any point. But the SAFE PLACE can also be a “default behavior”. This is because stress does not come only from one source. Stress can result from the training process, the expectation, the trainer, or the environment. For example, it is stressful for a dog that wants to earn reinforcement and does not know how to be successful. This may result in him barking or jumping to try a behavior which has been reinforced in its history. If this does not work, he may become more highly strung. All the confusion can lead into redirected aggression towards other subjects or real aggression towards the trainer. The safe place in this case would be any “default behavior” which the animal can use when confused. For example, an automatic sit. This default behavior becomes a universal answer not only for SAFE PLACE, but also for STOP (“When this is too much for me, I can sit”) and START (“I can express my will to start by sitting next to the trainer”).

An example of when the safe place is with the trainer is when training dolphins, if they are calmly

stationed in front of the trainer, and focusing for a period, they will be reinforced. This even if they have failed at a response.

Another example is an orangutan female in Prague Zoo, which, when failing to achieve the desired behavior had a habit of spitting which the trainers wished to extinguish. She was taught a default behavior “hold the station sticks with both hands”. This behavior was rewarded. This increased her calm responses and decreased her spitting. If she is confused, she simply holds the sticks and waits for the next cue. Holding the sticks tells the trainer “this is too much for me (STOP),” “I am doing something which I know can never be wrong (SAFE PLACE),” “Give me the new cue (START)” So balance in the triangle is restored. Another example is a male sheltie dog shown in our presentation, who barked at audiences when confused during his training sessions. He was taught an automatic sit as a default behavior which increased his



Pic. 10

calm participation.

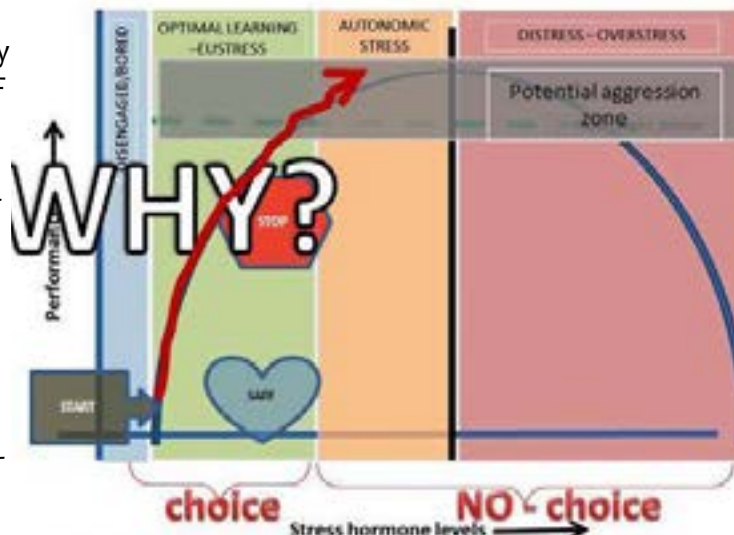
1) When all the answers do exist, but they are not in balance

When looking at the graph of the stress triangle, we can see the four questions have different activity results. START and WHY result in action while the answers for STOP and the SAFE PLACE stop the activity ensuring that the performance will not go over the FFF line. So a balance needs to exist between these two dualities. If START and WHY are too strong relative to STOP and SAFE PLACE, then there is a greater probability for aggression to occur. This is the case when activity that is being initiated is high energy work.

2a) When WHY is too strong

(Pic11)

A typical example is when the only motivation for performance is food drive through weight management. This is poor welfare for more than one reason. If we look at the stress triangle only one question of



Pic11

the stress triangle relates to food source, and this is the question WHY. The other three questions ask for control. Imagine that an animal is stressed in the training process, and would normally ask for STOP to alleviate the stress. However, the animal is so hungry (or sometimes not really hungry, but the reward is extremely attractive) that it does not choose the STOP and as a result, his hormones take him into the zone where potential aggression can occur. This animal is not reinforced for the trainer's presence. This animal is simply eating, which would naturally be hunting and the trainer is just the stressor which disturbs the animal's feeding process. Aggression is the logical answer. An example is the picture with the porcupine, where the big amount of food is already present.



Pic12

How can we establish balance in the system? By not relying on hunger to achieve the goal, focus on the behavior the animal really performs and use adequate reinforcers. An example is the process of desensitization of a porcupine to the trainer's presence.



Pic13

2b) When START is too strong (Pic 14)

This is expressed when the “high energy behavior” is strongly exhibited by the animal as a cue to start the training. Imagine a situation where a dog, who's START behavior to indicate “I want to work” - is jumping and barking. This behavior, on the start of the training session, is very high energy. This means that the training starts when the dog is already in the middle of the “stress hill”. What if the trainer does not answer immediately and does not give any cue to the dog who is so intensively asking to START? This dog needs to repeat its message more clearly, with an even higher energy. This dog can easily go into the zone of potential aggression before the training has even started. Asking him for another high energy response, can send him

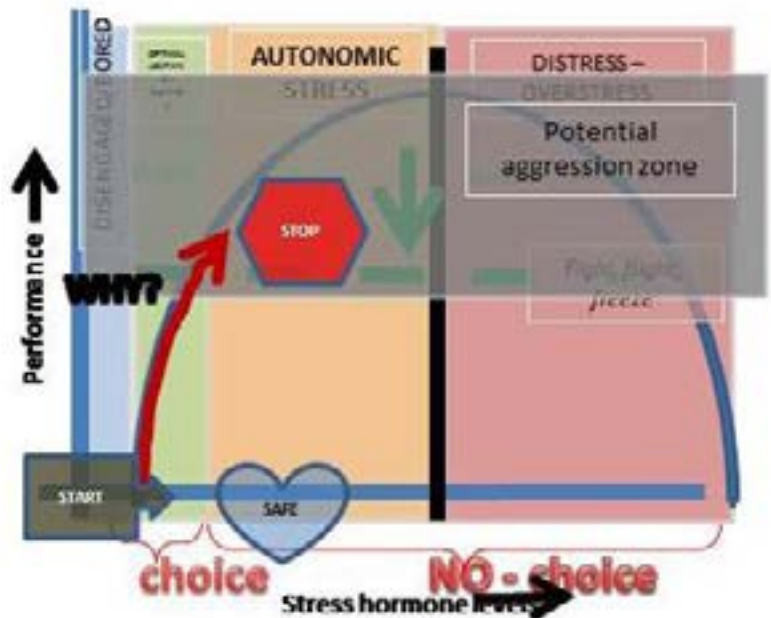


Pic14

over the FFF line. How can we reestablish the balance in the system? Give the dog another way to express START, any low energy behavior, like automatic sit. Training starts down the stress hill and gives more places for voluntary based communication and operant conditioning.

2) When learning curve is dynamic (Pic15)

The position of the FFF line (and the zone of potential aggression) is dynamic. The FFF line is not always in the same place. Environment, inner state and situation are some of the factors that will determine where that FFF line is in any given scenario. For example, if animals are in season, ill, or in foreign territory, the FFF line will be affected. If the FFF line moves down, there is less potential for choice-based behaviors and a greater probability for reactive behaviors, such as flight or fight or freeze. When our miniature pig was in season, she was more pre-disposed to aggressing than usual. Necessary castration showed, this animal had cystic changes on her ovaries. Maintaining an animal at choice requires creative uses of the tools at our disposal. These will be even more important when the FFF line is lower in the graph for any reason.



Pic15

(Pic16)

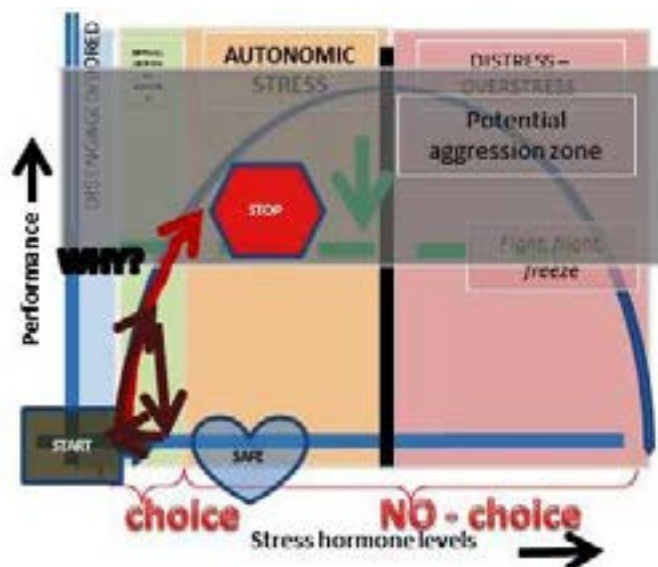
We have to keep in mind “of using the natural history of the animal to keep them at choice”. Depending on the species, the animal probably finds either low or high energy behaviors easier. For example dolphins are high energy animals, as are border collies. It may be difficult for these animals, particularly when they are young to moderate their responses when continually asked for low energy behaviors. One can use the high energy to reinforce the low energy. In this case, the high energy behaviors can be calming. In other more placid species, or individuals, the placid calming behavior would be low energy behaviors. These low energy behaviors can calm the animals down. In both cases, the ‘calming’ behaviors, when well reinforced, can become classical reinforcers. They affect the very physiology of the animal and assist in moving the animal out of the high stress zone.



Pic16

Let's go back to the example of a miniature pig in training. Pigs are naturally low energy animals. Our female pig's heat seasons were not always easy to predict especially because of the cystic changes described above. At times we already had the more aggressive responses before she had shown signs of being in season. In cases, she had overshoot the FFF line and became aggressive in her training. We have used the low energy cued responses of targeting to bring her back down and reactivate her focus. It is important to note that the low energy behavior in this note has also taken on secondary reinforcement value. It has been well practiced. For this reason, because of its classically conditioned status, it can be seen as an option for the animal that has over shot the FFF line. Fight, flight or freeze are no longer the only options. They now have another physiologically appealing option, a classical Pavlovian reflex, and that is to respond to the calming cue from the trainer.

(Pic. 17)



himself for his try, he tries to increase his power by making himself as active as possible. Dynamically walking, screaming, increasing his adrenaline to do big performance such as we can see at the stress triangle diagram. If he knows his technique for shot put automatically, he will not need to stay in the choice based quadrant. For the next seconds he does not need to think, bigger performance due to higher adrenaline is more important for him. He goes over the FFF voluntary and if you disturb him at this moment, his answer can be aggressive. Another situation would be, if his shot putting technique is not so automatic and he needs to think about his movement. For this reason he needs to stay in the choice based quadrant, where he is able to control all his actions and cannot increase his adrenaline as high as the first one.

In animal training we can see many examples similar to this shot putter, where staying in the choice based quadrant is not practical for the animal.

4a) Only high energy behaviors are performed

If the trainer chooses only high energy behaviors for a presentation, like many jumps one after another, this is useful for the animal to increase its power by increasing its adrenaline level. When the behavior is well trained and the animal can do it automatically, it does not need to control the movement and without thinking the high performance goes over the FFF line into the aggression zone. This aggression is typical for our young male alpaca from the Prague Zoo Animal show. To prevent his “play aggression” during the show we ask for low energy behaviors between high energy behaviors in the show.

4b) Behavior is established and done automatically, although high energy is not necessary

In animal training praxis we often say “this behavior is already done”. But, the behavior develops during the animal’s life and when we said it is done does not mean it is done for the animal. Especially when the reinforcer is too attractive (or the animal is hungry, the answer for WHY is too acute is written above), the animal will have a tendency to develop new forms of the behavior to increase the possibility to reaching the reinforcer. If the trainer does not increase the criteria, the only way to make the behavior more successful for the animal is to increase the power. And it means higher performance where more adrenaline is useful. It is shown from animal shows and dog sports, that another “play aggression” or “predatory aggression” can happen during behaviors which remain the same for a long time, including

An example of using the high energy responses to assist the animal to moderate their emotional state is when teaching a young female dolphin to offer calm responses. Dolphins are naturally high energy animals. She has shown signs of aggressing when, for instance being asked to lay-out for a long ultrasound procedure. To achieve the long calm behavior, her calm focus periods are approximated and reinforced by high energy behaviors of jumping.

3) More practical for the animal to have high energy than to have a choice
(Pic18)

It seems that for the animal and human it is always better to stay in the choice based learning quadrant; in some life situations this is not true. For example, humans in sports. See the shot putter preparing



Pic18

simple behaviors like target.

How can we reestablish balance in the system when this aggression happens? Simply give the animal reason to think again, increase the criteria or provide new behavior training into the middle of the training session.

In a presentation it has been demonstrated on a Harris Hawk originally trained by traditional falconer. This bird of prey for many years has been trained only to fly to the glove for food. This simple behavior became so automatic without necessity to think about it, that when the raptor came into our section, he was powerfully “hunting the glow”, esp. hunting people. If he missed, he only put more energy into new try. He became predatory aggressive on the people. To give him a reason to think about his behavior, we established “free shaping lessons” which improved his behavior during training. For a traditional falconer, when the raptor hunts trainer, the answer many times is “the raptor is heavy”, which means “he has too much energy”. They decrease the body weight and expect the high performance will decrease. Many times it works, when the reason was really “too much energy”. But if the reason is “still the same behavior and no progress in training,” decreasing body weight only increases the question WHY, which we know, can lead into aggression as well.

Another example is agility dog asked for many seasons for the same behaviors, who developed a strong superstition of barking during the performance. Trying to retrain this superstitious behavior only made it stronger and increased the possibility of aggression. Establishing short free shaping lessons into the training improved his behaviors in the rest of training; it gave him reason to think. This example is strongly connected with the situation described above, when the START is expressed by high energy behavior.

4c) We remain with continuous reinforcement schedule (CRF) on the same behavior for too long

As expressed above, when the criteria remains the same in the training, it opens space for aggression. But the criterion is not only about behavior the animal does, but also about the actual reinforcement schedule. From this viewpoint, remaining on the same schedule of reinforcement could logically produce aggression. There are many opinions between professional trainers. From my (František Šusta) experience it depends animal to animal; sometimes the intermittent schedule could produce confusion and so confusion based aggression (as above – when SAFE PLACE is missing). In another situation with different species, the continuous schedule produces the aggression and the way how to “make the animal think about” and stay in the choice based quadrant is the variable schedule. In my opinion, it depends on different trainers experience and responsibility and needs more discussion on this topic.

There are many other possible reasons for aggression, which can be expressed as the loss of balance in the training system. This balance, expressed by the stress triangle, can be reestablished when we understand it. Stress triangle is one way to understand this balance and think about these things. We wish that it will help you in daily training.

The dog training videos mentioned in this article can be found at www.trainingisdialogue.com

Training for the Unexpected: Offsite Free-Flight Programs

Cathy Schlott

National Aviary

The National Aviary has incorporated free flight programs into their off-site offerings. Programs include educational outreaches to locations such as schools and visits to media. However, there are several factors to consider and challenges to overcome in order for each program to be successful – for the audience, the staff, and the birds. Difficulties may arise from unfamiliar or startling stimuli, the location of the event, and the demands and expectations of the client. No matter the challenge, a few basic approaches are the key to an effective off-site demonstration. Things as simple as choosing the right bird, utilizing specific training techniques and acclimating animals to a wide variety of new objects and situations can make all the difference to ensure these outreaches are successful.

On top of the preparation for each unique situation and the trainer's dedication to the safety and comfort of both the birds and the audience, there is another crucial factor in a successful program: a lasting educational message. It can be tempting to rely on the spectacle and impact of seeing live animals, but it remains a priority to educate while entertaining. Achieving a balance between education, fun, excitement and safety during a live, free flight show is a challenge that cannot be underestimated. Bringing amazing animals into the lives of our audience can drive home important messages and leave lasting impacts. Creating unforgettable experiences for the audience is why preparation with the birds for any scenario is vital to having a successful off-site program.

The National Aviary is the “national” bird zoo of the United States and is located in Pittsburgh, Pennsylvania. We are an AZA accredited facility and a non-profit organization, operating primarily through admissions revenue and grants and receiving no federal funding. The majority of the exhibits are indoors due to Pittsburgh's climate, with some additional outdoor enclosures. The National Aviary houses more than 500 birds representing over 150 species from around the world.

The National Aviary has a separate education bird collection consisting of birds that are not housed on exhibit. This collection is comprised of 82 birds from a variety of species including an aracari, hammerkops, parrots, corvids, kites, owls, and eagles. These birds are used for a variety of programs such as free-flight bird shows, classes, outreaches, bird appearances for facility rentals, and media appearances. The National Aviary takes pride in the fact that the birds demonstrate natural behaviors during our classes, ensuring that not all of the birds “just sit there.” By engaging the audience with interesting, entertaining, and informative behaviors, the shows can further the National Aviary's mission “to inspire a respect for nature through an appreciation of birds.”

All of the Aviary's education birds are trained to do what we consider to be foundation behaviors for further training. Foundation behaviors include stepping onto a scale, going into a crate, and in some cases stepping onto the hand. Every bird is trained to step onto a scale so trainers can monitor weights and ensure that each bird is healthy. Using a scale and taking frequent weights of the birds provides a straightforward and non-invasive way to gather valuable knowledge about the birds. For example, just by knowing the weight of a bird we can monitor if they are going to molt or lay eggs. Additionally, since birds tend to mask their illnesses, a bird's weight can reveal underlying problems and provide important early warning of

potential illnesses. Crate training, one of the other foundation behaviors, is also very crucial to the training process. A bird's crate is not only used as a way to transport the bird to locations such as classes, outreaches or to house the bird while maintenance is done on its enclosure, but the crate also serves as the bird's "safe place." Maintaining the crate as a sanctuary for the bird helps to ensure that the bird will seek out its crate in times of stress and will remain calm within it.

Possibly one of the most important aspects of training for a wide range of situations is to have well-established behaviors. The first step is to incorporate desensitization and generalization exercises, during which the bird performs its behaviors in new locations and with different audiences. This process starts with small steps – first using familiar locations at the National Aviary, and then utilizing different areas including classrooms and even office spaces, to desensitize the bird to all of the different places they may encounter. Locations and audiences are not the only elements that must be desensitized. Items like cameras, mechanical equipment, moving objects, and any other variables that may be encountered should also be introduced to the bird if possible. In addition to introducing novel objects, keeping the bird focused also helps to ensure the bird stays calm in a variety of situations. We try to keep the bird focused on its trainers by only allowing the trainers to be the ones reinforcing the bird, instead of the audience or media. This means that the bird is only looking to trainers for its cues, and no one else.

One way to incorporate desensitization work into daily routines is to remember the importance of novel objects in enrichment. We do not always think of enrichment as being a part of training, but enrichment can allow the bird to become accustomed to new and novel items. Reinforcing to the bird that "new" does not always mean "bad" is important foundation work when working toward having a bird that is comfortable in a variety of situations. Enrichment is a great way to begin and continue to introduce novelty into a bird's life.

Although the items and objects the birds may encounter during programs are anything but natural, it is still important to us to showcase natural behaviors. The National Aviary highlights natural behaviors by examining what a species does in the wild and incorporating that behavior into shows and presentations. This allows both natural history and conservation messaging to be discussed with the audience in a simple and straightforward way. Our focus during conservation education programs is to create a memorable experience for the audience so that they want to go and protect these animals in the wild.

The National Aviary conducts what may be considered "traditional" outreach programs with non-flighted birds that will do simple behaviors like sitting on a glove or perch, or with birds like a penguin that will stand on a table. These programs are popular for school assemblies and similar formal educational venues. This style of program requires fewer staff, less time to set up, no evaluation visits ahead of time, and fewer uncontrollable variables.

Flighted outreaches, which combine theatrical show elements and classroom educational messaging, are a style of program that the National Aviary introduced several years ago. The goal was to produce an "on the road" version of the Aviary's popular free flight bird show and combine the best educational and entertaining elements. There are some notable challenges associated with these programs; although we make it a point to visit and evaluate the space before we go, the environment can still change before we arrive for the program; the size of the audience may change; the venue may be modified due to weather; the sound system could be broken or missing, or ceiling fans could be rotating when they should not be. There are many elements that are out of our control, and that is to be expected.

Flighted outreaches have been conducted in a variety of venues and for a variety of audiences, from gymnasiums to an open outdoor field at a Boy Scout camp. This brings up the additional challenge of performing outdoors versus indoors. Each location has its own variables and potential issues. These factors, along with the type of program chosen, in turn determine which birds are appropriate for the program. All of the Aviary's classes and programs have a particular focus or topic, and birds are selected for programs based on their behaviors and natural history, and how they work with the topic. Once the bird is selected, the correct behaviors must be chosen carefully as well for both the message being conveyed, and the venue/audience. For example, for a preschool class about bird feathers, the education staff may opt to use a green aracari for several reasons; this particular bird is trained to fly in a classroom and can showcase feathers being important for flight; She also is small and fairly quiet, making her less intimidating than a

larger bird (In some cases, young children have commented to education staff that larger birds are “scary”, so staff tries to be sensitive to that fact when determining birds for classes); finally, the green aracari is a veteran of many programs and has proven to be comfortable around groups of small children and in preschool classrooms, which often have materials or art projects hanging from the ceiling and walls. She is the right bird for this particular program.

The individual bird’s experience is important when selecting birds for a certain task. Often times the birds of the education collection spend years doing programs onsite at the Aviary before we begin taking them offsite, utilizing the principles of desensitization discussed earlier.

Media appearances are different than any other kind of outreaches. They are more demanding and less predictable. There are higher stakes involved to represent your institution in the best way possible. There are more uncontrollable variables with moving cameras and equipment, people rushing from one spot to another, and personnel who are not used to working around animals. Additionally, depending on the reason for the media appearance, other animals from other organizations may be present.

There are different things you can do to set your birds up for success. Focus on the variables that you can control. The most obvious variable you can control is which bird to take for the appearance. Birds show distinct temperaments in addition to their personal life histories, age, training experience, and known behaviors. Some birds will be obviously better suited to media appearances and similar situations than others. Training and desensitization can help virtually any bird to become more comfortable, but birds that have the correct temperament have a head start. It is the trainer’s responsibility to determine the right bird for each appearance.

For any public appearance or event, a solid “default” behavior is a failsafe for unexpected situations. The following example will showcase exactly why this is so important. National Aviary staff were making a national television appearance with a black vulture. In addition to the vulture, the show was featuring animals from another facility, one of which was being fed chunks of raw chicken. When the vulture made her debut, the television show host decided to give the vulture an additional “snack” and began to throw raw chicken pieces at the bird. The vulture was understandably startled, nervous, and uncomfortable with this surprise. Fortunately, the bird’s glove and crating behaviors are consistently solid. All that had to be done was to fly her to the glove and call her into her crate. She did it without hesitation, while flying in a television studio she had never seen, surrounded by several hundred people, as raw chicken was being thrown at her head – all because her failsafe behavior was so rehearsed she could complete it even while stressed and distracted.

Choosing the right bird is critical for success, but choosing the right trainer for an event is important too. The trainer must be quick to adapt and make good, quick adjustments. The trainer also needs to be able to communicate and negotiate with people who do not have experience working with zoo animals. This often necessitates the need to be clear and firm when conveying what the animal can and cannot do. During the Aviary’s experiences, particularly with media, people often have unrealistic expectations of the animals and their behavior. Having a trainer who is a good negotiator helps to ensure that the birds are safe and comfortable, and the people are happy with the appearance. In some cases, one might need to substitute one behavior for another that will be more successful. On top of the necessary “people skills”, an ideal trainer will also be someone that can train through challenges quickly and is good under pressure. And of course, they must have a strong rapport with the animal.

With the numerous distractions and factors present, it can sometimes be a challenge to keep the messaging at the forefront while doing media appearances. The television and radio hosts and directors always want entertainment but we want to provide education. Prior to the media appearance, there are several ways to set up for success. Sending general talking points and natural history information to the media contact can help to prepare realistic expectations for the type of information to be discussed. Upon arriving at the venue, meeting and speaking with the producer is an opportunity to get a clear picture of what the studio wants and expects. This is also a chance to see the space in which the presentation will take place and potentially do a walk-through or rehearsal. Practice combining the educational and entertaining components prior to the event itself and reiterate these messages during practice. It is possible to have the best of both worlds. The biggest challenge is not anthropomorphizing animals while still making

a human connection. There is no one correct way to present educational and entertaining information, but practice ensures that you have the best approach for maintaining the integrity of the presenter, the animal, and the institution.

Although it takes a lot of time to properly prepare for them, outreaches can be a great opportunity to expand your audience, especially through the media. Though preparations can be daunting, and appearing on live television can be intimidating, but the right preparations will set you and your animals up for success. Keep in mind why you are doing these outreaches – education is the key to making an impact on audiences and spreading messages about conservation efforts. Reaching hundreds or thousands of people through specialized outreach presentations expands this educational messaging, and with it, its impact.

Winged Encounters: The Kingdom Takes Flight - A Macaw Story

**Chris Jenkins, CPBT-KA; Arianna Bailey, CPBT-KA;
Dan Blair; CPBT-KA
Natural Encounters, Inc.**

Natural Encounters, Inc. (NEI) has lit up Disney's Animal Kingdom with daytime, living fireworks. Four times per day NEI flies 20+ macaws in a mixed species group about a half of a mile through the park where they land on a perch. There, guests get an up close look at the birds while learning about things like some of the conservation efforts going on in the wild. The encounter only lasts a few minutes and then in a burst of colors the birds are off to fly a half of a mile back to their large flight aviaries. This paper will help give insight into the huge undertaking of putting together this encounter. From hand raising these birds to their first step-ups and to flying outside and flying long distances with no line of sight in large flocks, this has been an extremely intensive process. The team at Winged Encounters has learned so much from this experience and continues to strive to learn more and better the project every day. Throughout the paper you will learn the ups and downs and the triumphs and mistakes the trainers and the birds have made as a team while sharing a conservation message that strives to inspire conservation action in the guests that witness this amazing experience.

The Pros and Cons of Stress

Karen Frost

Dog and Training

Stress is often thought as something that is bad for you. If we take a look inside an individual, there is no doubt that stress can be detrimental to both the body and the brain. High levels of stress hormones can affect different tissues and do damage, e.g. depress the immune system, elevate blood pressure and do permanent damage to brain tissue. This kind of stress is often caused by fear but it can also be created by frustration and expectations. When we clicker train our animals, we can accidentally create stress-related problems because we use the technique incorrectly. Clicker training can lead to frustration when the animal cannot solve the puzzle of how to get to the reinforcer. We can also create stress if we build too much expectation into our training sessions or other activities. This kind of stress is just as adverse although the animal seems to be having fun. Stress, however, is not always harmful. We have to remember that individuals that could produce a stress response have had an evolutionary advantage to those that could not. We see this in the fact that the stress response can be seen across a variety of species. It is also worth noting that low levels of stress hormones actually can enhance both the acquisition and performance of behaviors.

In our society we often associate stress with something bad. It is unhealthy and can cause serious harm to both mind and body. Stress in itself is not necessarily detrimental. The stress response is an evolutionary survival strategy that we see in many different species. It is designed to help us cope when we encounter dangerous situations, by activating our fight or flight response. The purpose of this activation is to prepare the body to be physically active. The release of stress hormones causes increased respiration, increased levels of glucose in the blood and high blood pressure, which makes nutrients and oxygen available to muscle cells. This helps our body prepare for rapid and intense physical activity. Stress also has a profound impact on the brain. The higher level of glucose due to the release of stress hormones is important for optimal brain function. The stress hormones also have a direct impact on brain function, especially on learning and performance.

Stress can be categorized into two types depending on the effect it has on survival and fitness. Distress is the type of stress most often described in the literature. It is the kind of stress that, if prolonged, can lead to a multiple array of negative effects in the body. From high blood pressure to an impaired immune system to a disruption of the functionality of brain cells. Eustress, on the other hand, can be defined as the kind of stress that increases an organism's adaptive capacity or as the kind of stress that is beneficial for both performance and learning.

We distinguish between three types of distress. When an animal encounters something that it perceives as frightening, a structure in the brain known as the hypothalamus will send signals to the amygdala, which is the structure that is associated with the fear network. At the same time the hypothalamus will send signals that activate the sympathetic nervous system and cause the release of stress hormones. In other words, whenever we feel fear, we are stressed. But fear, although the most studied, is not the only cause of stress. Stress can also be caused when we have high expectations of something pleasant about to happen. In dogs I see this kind of stress in dogs used for sports (obedience, agility, etc.) but also in pet dogs, when owners use toys a lot to stimulate their dog. This kind of distress is just as harmful as distress caused by fear, although owners do not necessarily recognize it as such. Behaviorally we see the same

signs of stress: vocalization, increased focus on the stressor (often toys) and a lowered threshold for aggression to name a few examples. The last type of distress is related to training. It can be caused by both fear and high expectations. The fear response can be caused by harsh training methods or a lack of predictability in the training. Fear of other dogs or humans can also cause distress in the training situation, when the dog is exposed to dogs/humans above its threshold when training. The high level of expectation can come from both the type of reinforcer, from the behavior asked of the dog and from an inadequate understanding of when to offer behavior in the dog. The latter is often associated with dogs that are constantly offering behavior during training.

Over the last few decades there has been a shift in training methods changing from focusing on when the dog makes a mistake and punishing it to focusing on when the dog gets it right and reinforcing that the desired response. There is no doubt that the welfare of all animals increases when we begin to train using reinforcement but the thought that we can do no harm as long as we use reinforcement is wrong in my opinion. In order for any technique to work, you have to have skills – that goes for training with positive reinforcement as well. In my opinion there are three factors we need to know about in order to be efficient in our training. The first is knowledge about how animals learn. Ordinary dog owners do not necessarily need to know the definitions on classical and operant conditioning, but they need to know that training and the emotions that kind of training generates become associated. They also need to know that if they add or remove something the dog desires or if they add or remove something that is aversive to the dog, it has an impact on that behavior that generated that consequence. Dog owners also need to know that training is an ethical choice. Both punishment and reinforcement work, but the feelings they generate differ greatly and punishment is never the only solution. I often get questions about “but what if...”? What if the dog chews on the chairs – do I not need to punish that behavior, so the dog does not do it again? To punish the dog might or might not work depending on the timing and intensity of the punisher but there is also another choice. Call the dog away, restrict its access to the chairs and offer other and better chewing opportunities.

In the zoo world there is a saying: “know the species – know the individual”. The same goes for dog training. The second factor is knowledge about dog behavior. Normal dog behavior and the common signs of distress are in my opinion the most important behaviors to know about. Knowing that dog communication is subtle, learning how to read dogs and how to react is essential to increase the welfare of the dog. Being able to tell when the dog is beginning to show signs of distress enable us to change our behavior in order to help the dog.

The last and equally important factor is to acquire mechanical skills. Knowing that timing, criteria, frequency and handling of reinforcers are important is not the same as being able to apply them correctly. We need to practice and this is an ongoing process. With every dog we need to apply the technique a little differently. I often describe training as an ongoing conversation where we as trainers ask: “Can you do this”? And depending on what and how the dog answers, we change our behavior accordingly.

When we apply positive reinforcement training correctly, there is little doubt that we can increase the welfare of the dog. We can create a training environment that causes eustress, which is not only beneficial for the dog but also for our training. The release of stress hormones in low to moderate doses increases both acquisition and performance of behavior. In order to prevent the concentration of stress hormones from becoming too high and thereby causing the dog to become distressed, it is important to monitor the dog’s behavior. In my opinion the key to keeping the dog in eustress is control. There are two aspect of control, the feeling of being in control and impulse control.

Whenever it is possible I prefer to give the dog a choice. If the dog feels it is in control, it will experience less distress. In the zoo world this is done all the time. For example teaching a tiger to volunteer its tail for blood drawing, an elephant to have its feet done and a sea lion to accept eye drops. In the dog world this type of training is rarely seen. I can only speculate to why that is so. I think it has to do with what Steve Martin and Susan Friedman so eloquently calls the trust account. Dogs are born with a huge trust account. Think how much abuse they can tolerate and still be reasonably safe to be around. Granted, some of these dogs do develop serious behavior problems, but a lot remain “normal” dogs. We can get away with forcing dogs to accept husbandry procedures they would prefer not to have done. They will become

distressed and fearful but it is possible to use this kind of force with what seems like little or no damage to the relationship to humans in general and the owner in particular (often it is only the vet or groomer that takes the heat). Teaching dogs to volunteer husbandry procedures would be preferable, but regular dog owners often do not have the time, motivation or skills to teach their dog to volunteer the desired behavior. An alternative is to teach the dog to tolerate handling which is easier and less time consuming. I teach my dogs both, the latter first.

The second part of control is to teach the dog impulse control. We can teach dogs to inhibit their behavior voluntarily. The choice of what behavior to perform is always the dogs but we create an environment where it is easy for the dog to display impulse control and where we can reinforce that decision. An example of this kind of training is a variation of the task Susan Garretts calls "it's yer choice". The dog needs to know how to offer voluntary eye contact before you can train this behavior. Have your dog in front of you in any position it prefers; i.e. sit, stand or down. Hold a favorite toy at arm's length at your own shoulder height. Wait for the dog to stop looking at the toy, if the dog knows how to offer voluntary eye contact, this is the behavior that is most likely to occur. When the dog looks away from the toy, give a release signal and let the dog have a game of tug-of-war with the toy. If it is too difficult for the dog, choose a less desirable toy and train voluntary eye contact first. For the dog to generalize the concept of impulse control you need to train a variety of these kinds of exercises and integrate them into your daily life with your dog. Aside from teaching the dog impulse control, this kind of training also teaches the dog to focus on its own behavior and not the reinforcer, which makes training much easier in general.

When we use positive reinforcement as a method to get wanted behavior we often rely on voluntary behavior and we often reinforce behavior with something the dog really desires. If we do not create a counterbalance to these intensity increasing circumstances we risk pushing the dog into distress instead of keeping it in eustress. Control taught through voluntary and careful training can act as a perfect counterbalance.

Resources:

Garrett, S.: "it's yer choice". <http://www.susangarrett.com/>

Martin, S. & Friedman, S. (2013): The Power of Trust, <http://www.naturalencounters.com/documents/The-PowerofTrust.pdf>

The Long & Winding Road: Turning Over a New Trainer on a 6 Year Old Blind 1.0 Fossa

Larissa Comb

San Diego Zoo Safari Park

The AZA Small Carnivore TAG recommends that the fossa (*Cryptoprocta ferox*) not be used as an education animal (AZA Small Carnivore TAG recommendation, 2004). As the largest carnivore of Madagascar, the fossa is an extremely strong and aggressive predator making them very challenging to work with free contact. For this reason it is not surprising there are only two working fossa ambassadors in the entire United States. While the ferocity of the fossa creates its own set of problems, one less obvious issue with the species in a large, dynamic training department is turnovers. The Wildlife Discoveries division of the Behavior Department at the San Diego Zoo Safari Park works with 40 individual ambassadors representing 21 species. With only nine full time trainers, an animal must be tractable and able to work with multiple individuals in order to be successful. When 2 of his 5 trainers left the department in 2012, it became imperative we focus efforts on introducing another trainer to our fossa “Jamba”. Given Jamba’s history of aggression towards new people and one previous unsuccessful turnover, this would be no easy task. Complicating the situation further was the fact that Jamba is almost completely blind. This paper will discuss the steps taken over the course of 2 years that ultimately lead to the successful addition of a new trainer to Jamba’s training team.

The fossa, *Cryptoprocta ferox*, is the largest mammalian carnivore endemic to Madagascar and occupies less disturbed forests around the coastline. The Nile crocodile is the only native carnivore larger than the fossa. While the fossa’s habitat is widespread, their population densities are usually low. In the wild they generally weigh under 25 lbs but are a powerful and ferocious predator. The fossa possesses acute vision, hearing and sense of smell. Sharp semi-retractable claws, large teeth and incredible jaw strength help them live up to their name *ferox* or fierce. They possess a long, non-prehensile tail that is about the same length as its body. This helps with balance in the trees as the fossa is both terrestrial and arboreal. Also aiding their climbing is the fossa’s ability to rotate their feet allowing them to easily climb down trees head first. These flexible ankles also support jumping from tree to tree. They seem to walk digitigrade on the ground and plantigrade when in the trees. Long whiskers help the fossa feel around its environment. Recently it’s been determined that the fossa is cathemeral, meaning irregularly active at night as well as during the day. The fossa has several scent glands, including one that emits an orange secretion coloring their underparts. The diet of the fossa is varied, but they are adept at hunting lemurs. They consume all species including the largest, the Diademed Sifaka. Tenrecs, rodents, lizards, birds, insects, and other animals have all been documented as prey for the fossa.

During mating, a female may occupy a permanent mating tree. Many males will gather at the bottom competing for the attention of the female with a significant amount of vocalization and antagonistic interaction. The female seems to choose the male she mates with and may choose to mate with more than one male. The female may spend as long as a week in her mating tree and another female may take over the tree when she’s finished. This mating strategy, whereby the females monopolize a site and maximize the available number of mates, perhaps helps the fossa overcome factors which would normally impede mate-finding, such as low population density and lack of den use. Copulation is long, sometimes up to 3 hours, due to the spiny barbs on the male’s penis which helps create a copulatory tie. Mating can be repeated several times with a single male. Litter size can be 1-6 but is typically 2-4. They are born blind and tooth-

less. It can take up to 4 years for a fossa to reach maturation.

The female fossa undergoes a strange developmental stage during adolescence known as transient masculinization. She develops an enlarged, spiky clitoris that resembles the male's penis, and secretes an orange substance on her underbelly which is usually only seen in mature males. These features diminish with age and the majority of adult females lack them. It's unclear what purpose this transient masculinization serves, but scientists hypothesize that it protects juvenile females from sexual harassment by adult males or aggression from territorial females (Hawkins et. al. 2002).

Much of the information we know about fossa behavior and natural history in situ comes from the field studies of Dr. Luke Dollar. Prior to his research the fossa was poorly studied. Dr. Dollar first went to Madagascar in 1994 as an undergraduate research assistant studying lemurs with Duke University. The lemur he was assigned to follow was eaten by a fossa. Dr. Dollar was surprised to discover the predator had never been studied and vowed to return. He states, "Here was a mysterious predator which sat atop the food chain in the world's top biodiversity hot spot, yet no one knew anything about it. As a flagship species, the fossa plays a crucial role in maintaining the equilibrium of Madagascar's entire food chain." (Nat Geo website). Dr. Dollar is considered the world expert on the fossa, and we have him to thank for a lot of our current natural history information.

Since being first formally described in 1833 by Edward Turner Bennett, there has been much debate over where to classify the fossa. It has physical traits resembling those of cats leading to early classification as a felid. However, it is now believed these similarities are actually a result of convergent evolution. The fossa has also found temporary homes in the Viverridae (civets and their relatives) and Herpestidae (mongoose) families over the years. In 2003, molecular phylogenetic studies using nuclear and mitochondrial genes showed all native Malagasy carnivores share a common ancestry that excludes other carnivores, meaning they form a clade and makes them monophyletic. These studies also showed they are most closely related to Asian and African Herpestidae. To reflect these relationships, all Malagasy carnivores are now placed in the single Eupleridae family (Yoder et. al. 2003). Controversy surrounding the fossa's taxonomy continues, and the exact number of members joining the fossa in the Eupleridae family remains unresolved but is usually between 8 and 10.

All members of the Eupleridae family are threatened. The fossa is listed on Appendix II of CITES and has gone back and forth between endangered and vulnerable on the IUCN Red List of Threatened Species in recent years. It is currently assessed as vulnerable and was given this status in 2008 by L. Dollar and A.F.A. Hawkins. It was previously assessed as endangered in 2000 by L. Dollar. The downlisting of the species from endangered to vulnerable was a non-genuine change in its extinction risk and therefore, does not represent a genuine improvement in the status of the species. (Hawkins and Dollar 2008).

Dr. Dollar's assessment is that the fossa is most threatened by the loss and fragmentation of their forest habitat as it is converted to farmland and pastures. They are also persecuted for preying on farm poultry or hunted by feral carnivores such as dog packs. Their numbers are on the decline with a population reduction exceeding 30% (possibly much higher) over the past 20 years (Hawkins and Dollar 2008). In order to improve the chances of the fossa's survival as a species, there needs to be better protection of the intact forests as well as education of the local human population of the value of the fossa for pest control. Unfortunately, the fossa is not currently protected under any Malagasy legislation and it's estimated there are less than 2,500 left in Madagascar (Hawkins and Racey 2005).

While fossas in situ are rare to see, there are also very few in zoos. Mandi Kreb of Omaha's Henry Doorly Zoo and Aquarium is currently the SSP Fossa Coordinator and maintains the North American regional studbook. Her current count (March 2015) has 38.30 fossa living in 29 zoological institutions in North America. This count includes non-AZA facilities as well. The director, Achim Winkler, and the head curator, Dr. Jochen Reiter, at Zoo Duisburg in Germany are the EEP co-coordinators and are responsible for the international studbook keeping for the fossa. As of December 2014 there were 36.24 fossa in Europe living in 26 institutions. This includes some non-EAZA facilities. Dr. Reiter estimates in addition to the 128 in North America and Europe there are a few fossas in Japan and South Africa. There are also 3.2 in a facility in Madagascar and possibly a few individual fossas kept in private hotels around the world.

Of the 68 fossas in North American zoological facilities, only two are working education animals:

Isa 1.0 at the San Diego Zoo and Jamba 1.0 at the San Diego Zoo Safari Park. The AZA Small Carnivore TAG recommendation in 2004 states that fossa should not be used as education animals. This is not surprising given their high propensity for aggression and their strength. Fossas can be unpredictable and highly discriminatory. It is difficult to guarantee keeper/trainer safety even with the strongest of relationships. Therefore, most fossas in captivity are managed successfully through protected contact, and the species is not an appropriate education animal for the majority of ambassador programs.

Isa and Jamba became ambassadors due to their exclusion from the breeding program. Isa was born on June 5, 2007 and had to be hand-reared due to maternal aggression. Isa and his brother were the only survivors of their litter. His brother's subsequent death from heart failure and Isa's own dental issues prevented him from entering into the breeding program. He currently resides at the San Diego Zoo's children zoo as an education animal. Jamba was born on June 8, 2008 to the same dam but different sire. He too had to be hand-reared due to maternal aggression. While Jamba's surviving two siblings (1.1) were returned to the breeding program, Jamba could not due to issues with his eyesight. His left eye opened prematurely most likely from the trauma experienced from his mother. By day 20 it was obviously misshapen and the third eyelid was more visible. On day 39 he was examined by an eye specialist who diagnosed bilateral cataracts with little to no vision. Our veterinarian staff believed the eye issues most likely had a genetic component. The Wildlife Discoveries division (WLD) of the behavior department at the San Diego Zoo Safari Park was contacted to see if we would like to try Jamba out as part of our ambassador team.

We were hesitant at first. WLD works with 40 individual ambassadors representing 21 species. On a daily basis, the department is responsible for 90 minutes of continuous animal presentations at the ambassador stage, two 15 minute presentations at alternate locations, a guinea fowl parade, 50 minute cheetah running demonstration and VIP experience, and on the weekends and holidays, an additional 25 minute behind the scenes program. On any given day there are also pop-up obligations like development requests, PR/media (on or off grounds), special events/parties, or school programs as examples. Therefore, with only nine full time trainers and six scheduled per day, an animal must be tractable and able to work with multiple individuals in order to be successful in our complex and dynamic department. We decided we would give Jamba a try and on September 25, 2008 he moved from the nursery at the San Diego Zoo to his new home at the Safari Park.

Jamba was aggressive from the start. We used blankets and sweatshirts to protect our arms and legs until bite inhibition could be trained. We did a lot of redirection with toys and trained a verbal cue of "eh eh" if he started mouthing us too hard. Over the course of the next 4 years as Jamba matured we had to consistently experiment and revise protocols in order to work with him safely and successfully. Below lists most of the changes we have implemented over time in somewhat chronological order.

Previous Protocol	Current Protocol	Reason for Change
Collar	Harness	Collar kept popping off
Using food at a station or seat to harness & unharness	Opportunistically harnessing with no food involvement	Inconsistency of behavior & aggression
Hand feeding meat	Throwing meat on ground	Food aggression/biting hands
Leashing inside crate prior to session	Traveling in crate with leash attached	Biting hands
Crate Cover & bedding	No access to any fabrics	Getting "hot" on fabrics
Blankets, rubber B.E., beds in pen	"Fossa-proof" B.E./furniture	Ingesting materials
	Introduction of high value reinforcers for crate behavior	Seasonal crate aversion
Enclosure with a single safety	Enclosure with protected contact	Anyone can service enclosure
	Introduction of jolly ball lure	Extension of A/E's & outlet for aggression

We currently house Jamba in a protected contact enclosure consisting of three rooms. Room 1 is his

main enclosure where he spends most of his time. Room 2 is where any staff member can pre-place food and safely shift Jamba using a guillotine door from outside the enclosure and service him. Room 3 is only accessed by trainers and no food is ever introduced into this room because it's where we do all our free contact harnessing and unharnessing of Jamba. We are able to transport Jamba all over the park grounds in his travel crate.

In terms of Jamba's repertoire as an animal ambassador, he can do anything any of our other ambassadors can do including presentations at the ambassador stage and other locations, taking pictures with our guests and VIP experiences, traveling to local news studios to promote conservation, walks around the Safari Park and special events. Jamba has become a successful ambassador for WLD, but it hasn't been without challenges. In addition to his special housing requirements, Jamba can be very discriminatory with our staff and has a history of tracking certain individuals while out on a session. We have experienced seasonal issues with some crate aversion. His aggression does not always seem to have discernable precursors. Guest and staff safety is always a concern, and we have a very strict carnivore policy at the Safari Park which requires an animal to go on a mandatory 30 day rabies watch if it so much as breaks the skin of a person. This greatly affects our ability to create our daily schedules. Jamba's triggers include food and the inherent aggression associated with it. Lack of direction or boredom can lead to frustration. He can get very hot on certain fabrics and rubber. In a nutshell, Jamba seems to want what he can't have. Finally, his blindness creates its own set of problems. Jamba is very sensitive to certain substrates as well as voices and smells of some people. Relationship and trust play a bigger part in his training than with other sighted animals we work with.

In addition to the problems associated with working a free-contact, aggressive, blind predator, one less obvious issue in a large dynamic training department is turnovers. Staff transfers may be a universal issue with this species in captivity regardless of ambassador or exhibit animal. A few institutions have reported nursery staff still able to maintain relationships with their fossas while new staff experiences aggression. In 2012 four fossas were born at the Naples Zoo in Florida. Two were transferred to other zoos, but female Duffie and male Luke (named after Luke Dollar) were trained to become ambassador fossas. At first both fossas would work with every trainer. But as they matured they began to pick off trainers one by one until each were left with only one trainer they would work with. When Duffie's trainer left, the new show supervisor attempted to form a relationship with her but was unable to. Finally, when Luke's trainer experienced displaced aggression during a failed turnover attempt, both fossas were returned to exhibit and the breeding program in 2014.

The San Diego Zoo has had some success with turnovers and Isa. After three failed turnovers due to aggression, Isa started to seek out his keeper Katie. He seemed curious about her and when he tested her, she didn't back down but moved toward him without fear apparently making a good first impression. This led to the first successful turnover. The team then switched to a two leash turnover where the existing trainer held one leash and the turnover candidate held the other leash in an attempt to increase safety. The team experienced one more failed turnover before finding success with Jamie. Her turnover is in its second year and she currently crates Isa, takes both leashes, and greets him during sessions. She has had no previous exposure to Isa prior to her turnover.

Jamba's first turnover attempt happened when he was almost 2 years old in April 2010 with Missy. Finding the time to devote to the turnover was challenging because it occurred during a period when we were responsible for a mammal show twice a day. In the turnover Missy took the leash early on and we allowed contact from the beginning with the understanding that there might be a "hazing" period. Our strategy was to tell Missy not to react and we were hopeful the aggression would subside with time. Missy had some success taking Jamba's leash during sessions and was even able to unharness him afterward. However, she was still experiencing serious aggression (leg grabbing, biting, and vocalizing) when she asked him to crate for morning servicing. This turnover was prior to our current protected contact housing. We discontinued the turnover after 4 months because we felt it was not worth the risk and there was no immediate need for an additional Jamba trainer.

In 2013 the situation had changed. Staff turnover resulted in only three trainers working Jamba. One of those trainers is a supervisor who has a lot of additional daily responsibilities to attend to. This greatly

reduced our ability to plug Jamba into our complex schedule. We were also concerned with overlapping days off with the three trainers. Finally, fire is a potential threat in San Diego. We wanted to make sure there would always be staff available that could evacuate Jamba in emergencies. We decided to attempt a new turnover with Jamba. This time we chose one trainer, myself, to spearhead the turnover. This prospect was a little intimidating as there was no blueprint for me to follow. Isa's turnovers were inherently different due to the fact that he could see. Going forward my strategy was to flood Jamba with my candidate to remove the novelty and "new play thing" mentality. I also wanted to make this a running turnover. Jamba typically resets from aggression very quickly and running helps that. It is also an incompatible behavior to aggressive leg grabbing. I realized from the zoo's success that this could take a few years and to consider that slow and steady wins the race. Finally, I was hopeful to achieve five elements of a training session. I wanted my candidate to be able to harness, crate, uncrate, work the session, and unharness Jamba. I knew the harness element would be the most difficult since it required the most contact and potential for aggression. A trainer can essentially crate, uncrate and work Jamba without ever making contact. Some contact is required to unharness Jamba, but he usually anticipates going home and being fed out so much at the end of a session that he never has any interest in the trainer during this element.

After spending some time considering candidates, I settled on Shannon. I looked at several factors. Shannon had been with WLD for 10 years at the time and has history being around Jamba. She also has experience working our free contact honey badger, another fierce predator. Shannon is coordinated and athletic, and Jamba has never had any history of severe tracking with Shannon. She wasn't working on any other turnovers at the time and she had the right attitude about Jamba. While she was respectful of his potential, she wasn't fearful of him. Our only challenge was the fact that we worked just 3 days a week together. We began the turnover on June 11, 2013.

In the beginning, I wanted Shannon to be a back-up on Jamba sessions as much as possible. On days we worked together, we always did a turnover session. I had her talking directly to him and around his crate including riding in the back of vehicles with him during transport. I had Shannon position herself in closer proximity to us during walks and runs than a back-up normally would. I told her during these sessions to never back away from him or "retreat", and she should trust that I would always re-direct him away from her. I also had Shannon start doing his side behavior where he stations at the side of the crate for food. I hoped this positive association with her and his food would help build their relationship. Finally I had her carry his crate on the open door side so he would have more exposure to her smell.

After a month and a half of these sessions, we began the process of handing off the leash. I selected a particular location to begin this leash transfer and I feel this played a big part in the overall success of the turnover. I liked the chosen area because it was a long and wide dirt road giving us a lot of space without any obstacles to negotiate. It was also behind the scenes so guests were not a factor. Finally, the road ran along a swamp that was very smelly. For an animal that is sensitive to smells, this location was a great distraction from the fact that there was a stranger holding the end of his leash. With the actual leash transfer, body positioning and hand placement on the leash was very important. I also wanted Shannon to learn Jamba's reach in relation to the length of the leash. She needed to know his strength and trust in her own ability to "stiff-arm" him away from her legs. Finally, she wore pants instead of shorts to give her added protection in the event he was able to make contact.

Over the course of multiple sessions we transitioned through several body placements. In the beginning I put myself between Jamba and Shannon. Shannon held onto the end of the leash but I had one hand on the middle. This way my legs and body were a physical block between them and I could pull up on the leash if need be. In this position Shannon was also able to get accustomed to the feel of the leash, the pace, and Jamba's movements. Soon I was able to let go of my hand giving Shannon more control, but I was still a body block and able to intervene if need be. Slowly, I faded back and eventually moved to the other side of Shannon. In this position, Shannon was in complete control of the leash but I could still grab it and take over should he come at her legs.

Once we were both comfortable with the progress we started to move to new areas including some public yet open locations. We passed the leash back and forth multiple times in a session. Shannon was even able to take him back after I had to take over due to increased leg interest. I also started having

Shannon observe and be more of a presence for his harnessing and unharnessing. We had to take a short break during the month of October 2013 but were able to resume the turnover in November. After one aggressive incident we seemed to get back on track to where we left off. Shannon started to take the leash for longer periods of time during the sessions and Jamba began crossing in front of her which requires switching hands on the leash and some coordination. We tried some smaller pathways on our walks which forced them to be in closer proximity to one another.

With the start of 2014 we had some new “firsts” in the turnover. Shannon uncrated Jamba to begin her session for the first time. I started to guide Shannon less on walks which required her to take her eyes off of him periodically to avoid obstacles on her own. While we still weren’t allowing Jamba to make contact with her during sessions, Shannon was able to unharness him for the first time. We capitalized on his eagerness to go home. He did smell her briefly, but then was ready to shift into room 2 as anticipated. Finally, Shannon was able to crate him for the first time. We chose a spot that he had a history of success at, the area’s scale, for her first time.

After a month Shannon experienced Jamba sniffing her a bit more during unharnessing which is atypical. We thought perhaps he was telling us he was ready to meet his new trainer. I decided to set up a first relate session in room 3 with two trainers as buffers. I also took him on an hour walk to tire him out prior to the session. I told Shannon it was important for her not to pull away from him like prey if he investigated her. At first it was going well and in retrospect I should have ended the session at that point. However, we kept it going which eventually ended in some aggression. I think the fact that Shannon was remaining neutral and not reciprocating his greetings became too “different” from how his other trainers behave. There was most likely some frustration that led to the aggression. After some discussion, we decided to try again outside his territory. In this new attempt, our supervisor worked Jamba while Shannon and I were her back-ups. At one point, I bent down and greeted Jamba as I normally would and Shannon immediately copied exactly what I did. It was successful. We repeated this process a few times and Jamba’s mouthiness decreased until he left her on his own finding her uninteresting and exactly the way we wanted her to be perceived.

Over the next 5 months, Shannon started to look like a true fossa trainer. She incorporated touching and greeting into her own sessions. She started to work with his jolly ball lure toy and improving her coordination. She was able to work him in shorts and began doing scheduled animal encounters at all locations. At the one year mark of the turnover we felt it was time to bite the bullet and attempt the harness element. Again my instinct was to place myself in room 3 with her to be able to assist if there was any aggression, however, we never have a second trainer during a harness session. Once more this may have been too different and my presence preventing Jamba from greeting her may have led to frustration and the aggression we ultimately saw. After this failed attempt we decided maybe Shannon needed to attempt this all on her own. On a different day I did a test harness in the morning to gauge his mood and to get food on board. Everything went well so a few hours later I had Shannon attempt the harness. I stopped all trainer activity in the area to remove any antecedents. My supervisor was stationed in the area and I was positioned right outside the door to assist if need be. Everything went well and there was no aggression.

As we approach the 2 year mark of the turnover there are still a few more things for Shannon to accomplish: scheduled animal encounters with non-trainer back-ups, flexi leash work, Jamba’s pole behavior, relates and nail trims, and finally taking him to news studios. But overall, our team could not be more proud of Shannon for all that she has accomplished.

In conclusion, I believe there are many factors that led us to the first successful turnover for our fossa. I believe we chose the right candidate and having one person spearhead the turnover for consistency was beneficial. Shannon spending as much time as she did around Jamba helped to build a relationship. Her confidence but respectful attitude helped her stay safe but also not trigger the predator/prey instincts. Delaying contact and introducing it outside of his perceived territory may have aided our success. Not attempting to harness Jamba for over a year from the onset of the turnover made sure both of them were ready from this intimate element. One of the key lessons learned was that it was important for Shannon to stay consistent with what the rest of his trainers do and not be different. Slow and steady definitely won this race. It’s important to remember with such an intense animal, you cannot rush things. Finally, I truly

believe this is a dynamic process and there will never be a cookie cutter procedure to successfully turnover new trainers on Jamba. We must be able to adapt and look at each situation and relationship as unique. However, hopefully some of the lessons learned through this experience will allow us to have more successful turnovers in the future.

Literature Cited:

Hawkins, A.F.A. & Dollar, L. (2008). *Cryptoprocta ferox* . IUCN 2008. IUCN Red List of Threatened Species. Downloaded on 11 March 2015.

Hawkins, Clare E. and P. Racey. 2005. Low population density of a tropical forest carnivore, *Cryptoprocta ferox*: Implications for protected area management. *Oryx* 39: 35-43.

Yoder, A., M. Burns, S. Zehr, T. Delefosse, G. Veron, S. Goodman, and J. Flynn. 2003. Single origin of Malagasy Carnivora from an African ancestor. *Nature* 421: 734-737.

<http://www.nationalgeographic.com/explorers/bios/luke-dollar/>

A Winning Formula: Education and Enrichment

Mark Kingston Jones

The Shape of Enrichment, Inc.

Education and Enrichment are both vital components of a good modern zoological collection. Evidence is growing that interest is prolonged through seeing active 'happy' animals, while seeing negative behaviours can detract from education and conservation messages. With this in mind it makes sense to combine these two aspects to maximize the development of both.

Conducting hand/stick feeds during public talks is an easy method for increasing talk attendance and prolonging stay time, as people get a closer view of an active animal. The question remains however, what message is being taken away from these talks and whether it is the educational information that remains or the image of 'tame' large exotics being fed by their keeper.

By substituting hand feeds with enrichment demonstrations we can still increase visitor numbers and stay time, while aiming to ensure the intended educational messages are delivered through the display of appropriate behaviours. Additionally by developing enrichment that can be used for public talks, further investment in animal welfare programmes is encouraged. This presentation therefore aims to focus on methods, which maximize visitor interest and good welfare. Examples for how this can be achieved will be provided and suggestions for future research areas will be offered.

What Applied Ethology Can Contribute to Animal Behaviour Management

Karolina Westlund

ILLIS Animal Behaviour Consulting

Animal Behaviour Management (ABM) typically refers to training and enrichment strategies with the goal of improving captive animal welfare. In this lecture, I will give an overview of Applied Ethology – the application of ethology to animals managed by humans, and how insights borrowed from this field may improve training and enrichment implementation. As an ethologist tasked with managing behaviour, I would ask: what types of behavioural adaptations can I expect from this species, given its ecological niche, habitat and social structure? Which of those are important to the species in question and should be prioritized, to minimize distress and maximize welfare? In my experience, three issues are particularly important from this perspective: the typical social structure and dynamics of the species, their foraging strategies and anti-predatory behaviour. Identifying and catering for behavioural needs is another use of Applied Ethology. In addition, this scientific field may provide unique insights into the prevention of maladaptive or malfunctioning behaviour, as well as addressing learning predispositions. Most often, it is unfeasible to recreate the natural habitat and range of an animal managed by humans. Instead, we must create a functional simulation of the living quarters of that species, a main focus being to optimize welfare. The science of Applied Ethology may assist in asking the right questions and focusing on the key issues. It is one theoretical framework, among several, on which practical enrichment strategies, and to some extent also training decisions, may be pinned.

Animal Behavior Management (ABM) typically refers to training and enrichment strategies with the goal of improving captive animal husbandry and welfare. Training and enrichment are, by nature, *practical* approaches to managing behavior, but good behavior managers typically draw on *theoretical* foundations in order to optimize the outcome of their efforts. Whether training and enrichment are indeed two separate entities may perhaps be questioned but is discussed elsewhere (e.g. Westlund, 2014).

Some theoretical disciplines that may be of interest to the fledgling behavior manager would be, in no particular order of importance: learning theory (how animals acquire information); applied behavior analysis (behavior modification by changing antecedents and consequences); affective neuroscience (how emotions influence behavior); and applied ethology (the application of ethology to animals managed by humans). A firm knowledge of the first two would help in animal training endeavors, and the last to improve enrichment and exhibit design decisions. Affective neuroscience is a controversial topic, but personally I think considering an animal's emotions has improved my understanding of behavior, resulting in better enrichment and training.

In this paper, I will give a rudimentary overview of applied ethology. Ethologists study behavior from the evolutionary perspective, trying to make sense of behavior as adaptations. Why do members of a particular species behave as they do? What survival value could specific strategies have? In contrast to the behavior analyst's perspective, who typically looks at behavior on a myopic individual level, the ethologist steps back to study behavior at the species or population level. These are two vastly different filters in understanding behavior, and I would argue that they are both useful. Personally, I think of it as wearing different hats. Someone wearing the behaviorist hat may look at the particular individual, its early experiences, the ABC-contingencies explaining specific behavior, and avoid the pitfalls of labelling behavior. Rather than using the label "aggressive", someone wearing the behavior analyst hat may say "when approached

by bearded men, the dog bites”. When wearing the ethologist hat, I do the opposite. I clump behaviors into categories. I may speak of “aggression” or “dominance” as a way to summarize all the possible ways that animals have in communicating that type of intent to one another – I’m not focusing on details. Since different species may use completely different responses in accomplishing this, labelling is a way to, on a general level, categorize and summarize behaviour, in order to predict better how animals will act in a certain situation. Being able to *predict* behaviour also means that we’re more able to *prevent* unwanted responses. As an ethologist, I’m an expert at labelling. Indeed, I have struggled to understand the aversion to labelling that seems to permeate the behavior analysts’ approach to behavior – I find labelling useful in the preventive aspect of the ethological perspective.

As an ethologist tasked with managing behavior, I would ask: what types of behavioral adaptations can I expect from this species, given its ecological niche, degree of habitat diversity and typical social structure? Many people working in the field of behavior management emphasize the importance of “species-appropriate behaviors”. Arguably, it is not necessary for animals to have opportunities to behave exactly as their wild counterparts do down to the minutest detail. Indeed, wild populations of animals differ in behavior profiles depending on habitat, current group structure, predator pressure etc – it is in their very nature to respond to environmental changes in adaptive ways. To me, the question to ask is: Which of the plethora of behaviors seen in free-ranging animals are important to the species in question and should be prioritized, to minimize distress and maximize welfare? In my experience, three issues are particularly important from this perspective regardless of the species, namely the **typical social structure and dynamics** of the species, their **foraging strategies** and **anti-predatory behavior**. Below, I list some of my concerns regarding these three prioritized issues.

Social structure and dynamics

Different species live in groups differing in size depending on typical predation pressure (how risky the environment is) and how food is normally distributed. Some animals simply aggregate in big groups, where individuals are unfamiliar with one another. Others live solitarily and meeting conspecifics results in aggressive or sexual behavior (e.g. hamsters, figure 1). Some species are more flexible than others and may have variable social systems depending on the current environmental situation, others are always found in the same type of social grouping.

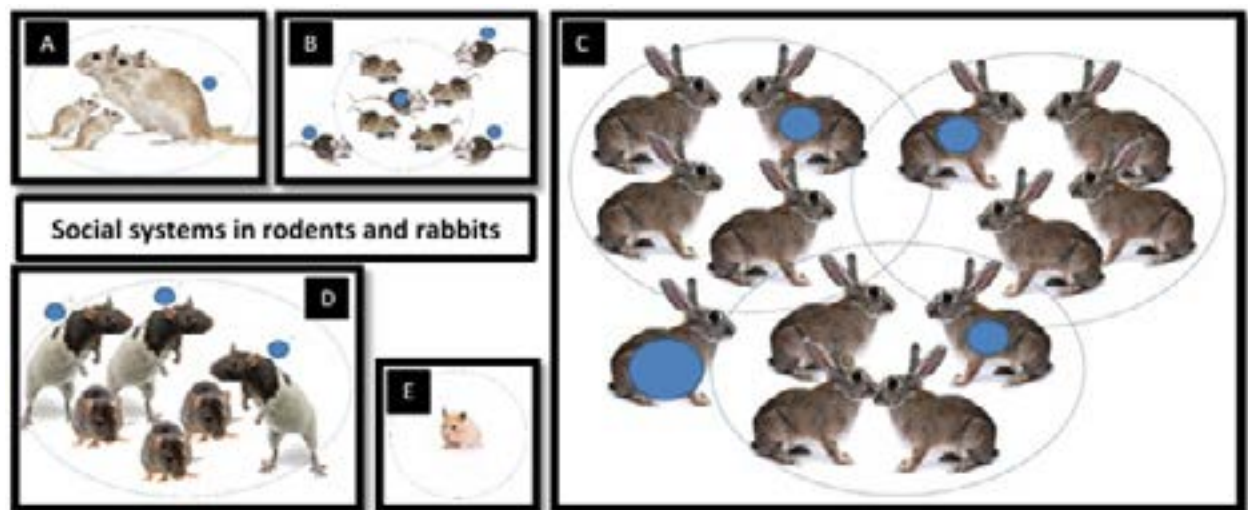


Figure 1. Typical social systems: A – Gerbils are typically monogamous with *primary helpers* (offspring staying in the group to help take care of the next generation of siblings). B – Mice live in differing social systems, but if several males are in the neighborhood they tend not to be fully integrated members of the social group – they rather take the role of “*satellites*”, and the harem holder aggressively chases them off. C – Rabbits generally live in aggregations of harem groups with one dominant buck. D – Rats often live in stable multi-male / multi-female societies. E – Hamsters are typically solitary. Images: 123rf, Wikimedia and pixabay.

As a general rule and outside the mating context, animals tend to be aggressive towards strangers and non-group members. Also, males are often more xenophobic (fearful of strangers) than females. Being familiar with group dynamics is thus tremendously helpful in predicting where incompatibilities with ensuing aggression may arise. Below are three important questions to ask, depending on the species:

- Group size – max/min?
- Gender distribution – how many males to females?
- Migration patterns – which gender leaves the natal group?

Based on these questions and the social systems outlined in figure 1, we may predict that if gender-specific problems related to aggression would occur due to social mis-management, it would be when attempting to house male mice or male rabbits together. Indeed, it is commonly reported that male mice fight when housed together, unless specific precautions are taken (van Loo et al., 2003).

In truly social groups whose members recognize, interact with one another and compete over resources, it is also valuable to consider the increase in social complexity with increased group size. This correlation is not linear but exponential. In a group of two individuals, there is one relationship. In a group of three individuals, there are three relationships. In a group of six individuals, there are fifteen relationships. How complexity influences the nature of social interactions will differ between species, but is worth keeping in mind.

Foraging behavior and time budgets.

In the wild, animals compete over resources. How food is distributed in captivity is therefore important, since many animals' evolutionary adaptations lead them to continue competing over resources even though there is plenty. They also spend a lot of time working to obtain food, and display different behavioral sequences to procure it (see figure 2). Each step in this sequence may be triggered by different stimuli. In poor environments, where stimuli are lacking, animals may lack the information needed to complete or “snap out of” an initiated behavioral sequence – this is where stereotypic behavior may ensue.

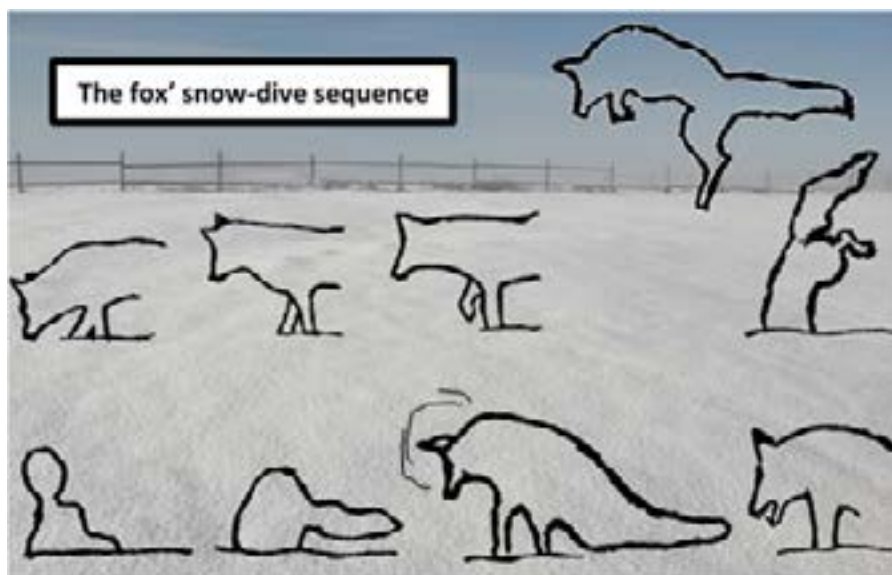


Figure 2. A fox hunting in snow may smell the surface, listen for sounds of rustling prey, stalk, jump, land and catch the prey animal, then withdraw, shake his head, and chew and swallow. Each step in the behavioral sequence is initiated by a triggering stimulus.

Different species display vastly different behaviors to obtain food. Grazers, browsers, omnivores and predators have food supply that range from predictable and abundant, where no food competition is warranted, to unpredictable and scarce, and where each morsel of food is vehemently defended. When

planning enrichment interventions, it is valuable to give a thought to the predictability of food supply for the animals, whether there is competition, and to what degree the SEEKING system is activated during foraging (a core emotion linked to exploratory behavior, see e. g. Panksepp, 2011) versus how often the animal switches from SEEKING to appetitive behavior (actually ingesting the food). In other words, does the typical feeding behaviour of the species involve simply standing there chewing where food is abundant, or does it actively search for food?

Food acquisition typically consists of foraging (using sight, smell and hearing as the primary senses) involving the detection and acquisition of edible items. Foraging is then followed by processing (using smell and taste) involving preparing the food to edible morsels and eating. Foraging enrichment may thus facilitate the whole sequence of behaviors or target specific responses within the animal's foraging repertoire. Addressing multiple senses associated with food acquisition is also beneficial.

In addition to being familiar with common foraging sequences in the species in question, ensuring nutritional aspects of feeding is important. Dominant animals may monopolize access to preferred food items, affecting nutrition across the whole hierarchy. Visual barriers may be an approach to minimize the effect of dominance interactions, as is scatter feeding. Animals often prefer to work for food to having it freely available (so called contra-freeloading).

Preventing and addressing FEAR.

Fear may incapacitate animals, impact learning and welfare, and lead to defensive aggression. Different animal species display different fear-related behaviors. If they are only a little anxious, they may freeze and become immobile, which reduces the risk of detection by a prospective predator. As fear increases, they may flee; run, burrow or climb a tree depending on their natural adaptations. From the ethological perspective, it is important that they are allowed to carry out these behaviors. If a zebra becomes frightened, it should be able to run off until it has reached beyond the flight distance of the animal in question (the distance from which the animal doesn't respond to a stimulus by moving away from it). A macaque should have climbing opportunities and prairie dogs should have multiple burrow entrances. It is important that all animals in the group can respond to perceived threats: for instance, rats may share a shelter, whereas mice may not. Indeed, here it's useful to temporarily remove the ethologist's hat and look at the individual animals: compatible partners may well share a shelter regardless of species, or they may refuse access to an incompatible group mate.

Preventing fear is easier than "curing" it. From this perspective enclosure design, including shelters, visual barriers, multiple escape routes, attention to flight distance and how vertical space is available is important. In addition, the individual animal's learning history is key. Often, animals have a sensitive period when they are young when they are more prone to develop fears than when they are older (reviewed in Serpell & Jagoe, 1995). By properly addressing this through socialization and desensitization, the risk of fear development to people, animals, or procedures may be evaded. Evidently, through planning (avoiding known fear triggers) and training (including systematic desensitization and counter conditioning), exacerbated fear responses may be avoided. Animals are often neophobic (afraid of novelty) so introducing new stimuli in a well-known situation where the animal can investigate them on their own terms is important. With regards to transporting animals between facilities, one approach may thus be to introduce known items from the new facility in the old housing and move some of the favorite and well-known objects to the new facility to reduce the novelty impact of the transition.

Conclusion and more

Most often, it is unfeasible to recreate the natural habitat and range of an animal managed by humans. Instead, we must create a functional simulation of the living quarters of that species, a main focus being to optimize welfare. The science of applied ethology may assist in asking the right questions and focusing on the key issues. In this paper I discussed three important topics, namely the social structure and dynamics, foraging and time budgets, and preventing and addressing fear. However, there are other uses of applied ethology, such as identifying and catering for behavioral needs. In addition, this scientific field may provide unique insights into the prevention of maladaptive or malfunctioning behavior, as well as ad-

dress learning predispositions. Applied ethology is one theoretical framework, among several, on which practical enrichment strategies, and to some extent also training decisions, may be pinned.

References

Panksepp, J. (2011). The basic emotional circuits of mammalian brains: do animals have affective lives? *Neuroscience & Biobehavioral Reviews*, 35(9), 1791-1804.

Serpell, J., & Jagoe, J. A. (1995). Early experience and the development of behaviour. The domestic dog: Its evolution, behaviour, and interactions with people, 1, 79-102.

Van Loo, P. L. P., Van Zutphen, L. F. M., & Baumans, V. (2003). Male management: coping with aggression problems in male laboratory mice. *Laboratory animals*, 37(4), 300-313.

Westlund, K. (2014). Training is enrichment— and beyond. *Applied Animal Behaviour Science*, 152, 1-6.

Implementing Choice and Control at the Chimpanzees in Copenhagen Zoo

Mikkel Famme

Copenhagen Zoo

Background: Often zoo animals and also our chimpanzees have no control of their environment. Before we implemented the new management, we had to lure our chimpanzees by feeding them in the exhibit we wanted them to enter, this often failed. We have an artificial rain system, which is controlled by a computer. We listen to music while working, because we like it. We choose the food they eat. A lot of management and environment things, which the chimpanzees doesn't have control over.

Implementing: First we changed our management; we now 'ask' the chimpanzees to leave an exhibit, and if they all exit – we reward them after closing the gate. If they try to run back, while we are closing – we reopen the gate and start over. They choose if we can enter the exhibit we request. The next step was a button where the chimpanzees could turn on the artificial rain, they now had the control of this. Latest invention is an ON/OFF electrical button where multiple things can be plugged into; radio/music, fan, light, etc. – they decide of it's on or off. This gadget will let the chimpanzees choose if they really want to watch TV, listen to music or have the light on or off – all decisions take for them, and sometimes think they like.

The future has more changes to come, more control of their food, substrates and bedding material and also control/interaction of/with the visitors.

This is a short description of the changes and enrichment devices, we have made – if you need more details or information, please contact me:

Our new management plan - calling/asking our group of chimpanzees to move or exit an area is very successful.

After the change, our chimpanzee's behavior towards our cleaning procedures have changed. They now cooperate and participate and past problems are almost gone. They no longer misunderstand our request or misbehave.

Example of our new management technique:

1. First we "setup" the gates – showing which area we want to clean
2. Many of the chimpanzees have already left the area, because of the setup which shows them our plan
3. We call the group and tells them; we want to close the last gate
4. When every chimpanzee has left – we tell them again "We're closing the gate"
5. (If any chimpanzee regrets and want to go back – we re-open the gate)
6. When the gate has closed, we reward the whole group with a portion of their daily feed

We now "play with open cards" and this makes it easier for the keepers. There are many benefits for the chimpanzees- less stress, more control and much more.

Choice and Control is very important for our daily management and we want to give the chimpan-

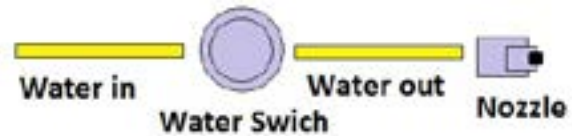
zees as much control as possible. We have many upcoming management ideas, but I personally have also



FRONT



BACK



created some enrichment devices, which is choice and control based.

The Water Switch was the first I created and made it possible for the chimpanzee to turn on an artificial rain system. This enrichment is something they enjoy very much. It is a great group activity because it starts grooming behavior in the entire group.

The Power Switch was my second choice and control invention. This is very simple and has multiple possibilities because only imagination limits the options of enrichment. I have tried a hairdryer for warm air, an office fan for cool air and a radio. The radio was actually the inspiration to this switch. I would like to credit Sabrina Brando for the inspiration, as she inspired me.

The animal often listens to the keeper's music/radio, because keepers often like music while cleaning,



ning, but the animals, and in my case, the chimpanzees do not have a choice. With the switch, they can now "tell me" if they want the radio on or off.

The chimpanzees often only choose 'on' – and may not yet have learned that they have the control, and therefore can turn stuff off too. If I turn the enrichment off, they turn it back on again.

All this work is still in the testing stage and if successful will be made into permanent enrichment devices within the chimpanzee enclosure.

In the future, we want to give our chimpanzees more control of the environment, the food they eat and even the visitors – all this we will try to implement in our management. I will too create new enrichment.

Control is important for the welfare and often is easy to give, if you see the possibilities.

All my work and enrichment is for sharing – if you need explanation, pictures/videos or anything else, please contact me:

Mfa@zoo.dk

My Taxi Ride

Jen Hickman

Denver Zoo

After 16 years as a zookeeper, I felt that I was confident and successful in my training techniques with a variety of species. However, my world was turned upside down when I adopted an American Bulldog mix named Taxi in July 2011. When I adopted him, he was a sweet boy who according to his foster mom had a tendency to get “spun up” with bursts of uncontrollable energy. Two weeks after bringing him home he attacked another dog while on a walk. A few days after that the vet deemed him unsuitable to be in a household with children. This was a major issue because I have two daughters, then 10 and 7 years old. After seeking out a behaviorist, Taxi was termed “reactive and fear aggressive.” As a trainer, I felt I could handle this. I had experience working with aggressive species. My plan was to simply apply those skills to Taxi. However, I learned that it is a whole different ball game when the safety of your family is involved. For two years I consulted with zoo peers and a few dog training peers and made slow progress with Taxi. After Taxi attacked an off leash dog that ran up to him, I hired a professional dog trainer. Now Taxi is the center of my world. We are currently traveling this training road that has merged zoo and dog training worlds together and are doing so successfully.

Introduction

As a zookeeper, I know that my animals at work are better behaved than my ones at home. After talking with many animal professionals throughout my career, I know that I am not alone in this. It is difficult after long day at work to come home and feed and clean up after your animals at your house. Training and enrichment is another story. Yet as a trainer, I am also aware of what behavior problems my dogs have. I also have ideas on how to help resolve these problems.

In July of 2011, I adopted a dog, Taxi. I could no longer make any of these excuses after adopting Taxi; he brought issues to the table that could not be ignored. I have owned dogs all my life, but had not faced such challenges until Taxi entered my life. I have been a zookeeper since 1998, and throughout my career I have worked with a variety species. I felt like I had pretty solid training skills that could get me through any training situation. Taxi challenged my skills. In doing so he has made me a better trainer, and his quality of life has greatly increased as a result.

Our Journey

During the summer of 2011, our dog Blake had lost his good friend, Taemu, and needed a new buddy. My family began an extensive search for a new dog. We began by all four of us listing ten dogs that we liked from an internet search. From there we narrowed it down to five dogs that all had chosen. We met with three of them. Blake came along with us for these meetings. Ultimately Blake would have to live with this dog so we wanted to allow him to choose. He chose Taxi.

Taxi, an American Bulldog mix, was at a rural county shelter in Northeastern Colorado. The shelter supervisor saw something special in him and called upon a favor from National Mill Dog Rescue. The owner of Vail Doggie Day Care offered to foster him. He then made the move to Vail, Colorado where he spent the next 6 months of his life.

When Taxi and Blake met, they seemed to get along great. We went home to discuss the pros and cons of the dogs we had met and decided Taxi was a good choice. A week later we headed back up to Vail

to pick up Taxi. Taxi's foster moms filled us in on his personality. They mentioned that he had a tendency to get "spun up". They said he liked to push boundaries, but if we stood firm he would back down. Once at home, he was well behaved. Blake seemed happy to have a buddy again.

Baring Teeth

A week or so after we brought Taxi home, we took him to our family vet that we have used for years. When the vet went to listen to Taxi's lungs and heart, he reacted with a growl. Every time the vet tried to approach, his growl would escalate until he was baring his teeth. He was due for vaccinations, so the vet muzzled him to give him the injections.

The appointment went downhill from there. The vet stated to us that she did not feel comfortable knowing that Taxi was in a home with children. She recommended that we consult with a behaviorist. We were crushed and unsure of where to go from there.

The next baring of teeth occurred shortly after the vet appointment. On a walk with Taxi and Blake, we encountered a dog that seemed eager to meet them. I mistakenly assumed that since Taxi had been fostered in a doggie day care, he was dog friendly. Taxi attacked the other dog by going for its throat. I was shaken up. I was no longer confident walking Taxi. I also was more nervous about what else would trigger him to become aggressive.

Since my confidence in Taxi had fallen, he started barking and lunging at every dog we passed on our walks. Each time I pulled him tighter to me. The aggressiveness kept increasing. My neighbors were now calling him "Cujo". It was embarrassing. Those neighbors closest to my house knew that I was a zoo-keeper.

The final straw came about 18 months later. As we were walking in the neighborhood, a small dog jumped out of a car and ran up to Taxi. The next thing I knew, Taxi was shaking the dog in his mouth. Luckily, I was able to get him to drop the dog. Unfortunately by that time, the dog had severe injuries that required multiple surgeries. The dog survived but my confidence with Taxi had not. I knew that we needed more help than what we were getting at the time. Nobody wants to admit failure but I knew that I had failed Taxi.

Family Safety

Taxi's aggression was not always directed at other dogs. He was nervous around my youngest daughter. There were a few growls directed at her. At the time I had two daughters aged 7 and 10. I also had many nieces and nephews younger than 7 years old. My daughters had friends coming over frequently. I had to stop having family gatherings. I limited the time and amount of friends coming to our house. When they did come over it was with strict instructions and direct supervision.

The safety of my family was a high priority. We had many discussions about whether we should rehome Taxi or not. Taxi got nervous and upset even when we rearranged the furniture. We had concerns about his ability to handle a new situation such as a new home. I also knew that I had a lot of resources to help me with this. We decided to stay with Taxi and work through this as safely as possible.

Confidence

I knew that we could help Taxi, but I was also realistic and afraid of what Taxi's aggression was capable of. We took as many precautions as possible to be safe. We limited the opportunities for Taxi to rehearse his aggression. We walked him in the dark at night. It was like walking in a war zone. Oncoming dogs and people were difficult to see. We also discovered that other reactive dogs walked at night. I was unfamiliar with this kind of fear in a training situation. At the zoo, I was able to approach my behavior conflicts with confidence and little fear.

Taxi was also not able to approach uncomfortable situations with confidence and without fear. It seemed that he felt he needed to be the leader and take charge in each situation whether he was comfortable with it or not. I was not there showing him that "we got this". I did not have the confidence to take charge and allow him the opportunity to be comfortable.

My Own Worst Enemy

In my desperation to help Taxi, I brainstormed and implemented various ideas. These ideas would be effective at first. As soon as they stopped working, I would try something different. I would jump from one idea to a next and even back to previous ideas. I had completely forgotten about writing up a training plan. I felt that I just needed to figure out how to help Taxi before anybody or another dog got hurt. In most of my zoo training, I had not felt this kind of urgency.

Also different from the zoo was my emotional involvement. I do love my zoo animals, but they are not my family. In the short time that Taxi joined our family, we had all fallen in love with him. I felt a strong responsibility that I could not let my family, including Taxi, down. Too much was at stake.

Time and money put restraints on what I could do. As a mother of two, I was busy. I also had a husband who worked full time. Adding more responsibilities at home was difficult. It was also challenging to be able to afford a dog trainer. A zookeeper does not get rich in this profession. We do it because it is our passion.

Training Obstacles

During the majority of my zoo career, I trained mainly restricted contact. This changed the past 3 years when I began to work free contact with Asian small clawed otters. For most of my career when I encountered aggression, I could safely walk away, re-evaluate the situation and return at a later time. Even with the otters, I could leave the holding stall if I felt either the animal or myself was in danger. I was not able to walk away, give Taxi a chance to calm down, and then return to a similar situation later with a new plan.

I also was not able to manipulate the environment as I could in a zoo setting. At least I was not aware of the ability to do this with Taxi. In my training experience I was able to set up the situation for success. It would have been interesting to tell other people and their dogs to stop and then direct them on how they should approach or not approach Taxi. I was not able to control what Taxi and I would encounter on the walk.

At work I had become accustomed to having shelves, floors, and training pouches to place whatever tools I needed near me. With Taxi, however, I found that it was challenging to hold a clicker, treats, leash, and poop bag all while focusing on walking and training. There were too many moving parts. I could only concentrate on one thing at a time. Being in this situation was a good reminder that my animals may also only be able to concentrate on one thing at a time. This could be especially important in a dynamic environment.

Classical Conditioning

At a previous Animal Behavior Management Alliance conference, I presented on using classical conditioning to reduce aggression in a Wolf guenon. Kasai was a wild caught guenon who would display at new people working in the area and to certain types of zoo guests. My training plan was to pair these stimuli with peanuts - his favorite treat. Over time the aggression decreased.

Since I had that success with Kasai, I tried to translate that plan to Taxi. I worked on pairing positive associations with young children and other dogs. It worked successfully with young children. I am now able to allow young friends to come over to the house. Each time a new friend comes over, we have that person feed Taxi treats while he remains calm. The relationship between Grace, my youngest, and Taxi has become endearing. Taxi now seeks out Grace when he is anxious.

I did not have the same success with other dogs. I had simplified the concept to feeding treats whenever there was another dog nearby. I would pull Taxi aside and attempt to give him treats. Pulling Taxi aside from the sidewalk or path became a cue for another dog coming. It seemed to increase the anticipation and anxiety.

Help!

I could not do this on my own. When we made the decision to keep Taxi, one of the supporting reasons was that I had the resources to do this. I needed to call upon those resources. Taxi is good at commu-

nicating if we just listen but I could not understand his language.

I started with the behaviorist that the vet had recommended. I spent 45 minutes on the phone, 1 hour in person with the family and both dogs, and then followed up through emails. The behaviorist labeled Taxi “dominance aggressive”. This label did not seem to fit Taxi. He did have some resource guarding, but his aggression seemed to come from fear. She did introduce us to the “Learn to Earn” program. This plan had Taxi sit calmly in order to receive food, treats, or attention. This had some success.

The behaviorist also recommended limiting the number of toys we gave Taxi. This would help with his resource guarding. We gave this a trial period and saw the opposite reaction. The toys were now a limited resource. I turned to the Behavioral Husbandry Curator at the Denver Zoo for help. Her suggestion was to give Taxi choices. If the resource is plentiful he has the options to choose from all these toys. We would reward him for making the right choices. It worked beautifully.

Working with the behaviorist did not achieve the goals I had set for Taxi. We were still seeing dog-dog aggression. I then turned to a friend who was a former coworker at the Denver Zoo and now had her own dog training business. She lived 75 miles away, but we gave it a go. She met with the family and both dogs. After assessing the situation, she determined that Taxi’s issues started with a negative emotional response. In order for us to make any progress with him, we needed to turn this around. If he is already in a negative emotional state, operant conditioning was not going to be successful.

We began with desensitization and counter-conditioning to form a positive conditioned emotional response. I had already done this with the muzzle. The muzzle means we are going for a ride. The leash, also positive, meant going for a walk. I needed to work on getting a strange dog to equal good treats. This would take time, consistency, and repetition.

The second strategy my friend suggested we work on was the Cue-Response-Reward Model. This would only be used in situations where Taxi was already comfortable. The goal of this was to create predictability in Taxi’s life. It gave him more control of his environment. The details of what we worked on was if he sits, he gets his food. If he waits calmly when asked, the door to the yard will be opened. If Taxi lay down when asked, he would get petted. Taxi began to form a better relationship with us as we worked through this plan. He also seemed to gain some confidence around the house.

The last protocol we used was object guarding. My husband and I began with this behavior to ensure the safety of my daughters. For this, my husband and I would give Taxi a low value object. We would then remove the object, give him a high value treat, and give him back the object. Taxi quickly learned that having an object taken from him is a good thing. He gets treats and most of the time gets the object back. Taxi did have a tendency to gather his own objects such as stuffed animals, toilet paper, and blankets. We could not return these items to him, but could give him an extra good treat when we were able to take them from him.

I understood all the recommendations that my friend had given me. I was not familiar with the details of the techniques with dogs. My friend was great about emailing and discussing problems as they arose over the phone. It seemed to be working for a while. Then the second dog attack occurred. We both agreed that I needed a trainer that could work with Taxi and I in person.

A Trainer for the Trainer

After a few phone calls and recommendations I found a trainer who specialized in aggression cases. She came over for an initial consult and fell in love with Taxi, and Blake too. She assessed the house, neighborhood, and our time situations. Her recommendation was to go back to the basics.

The trainer’s first recommendation was no more walks. The walks were rehearsing the aggression. Taxi was already at a higher excitement level before we were even getting out the door. This was not setting up the situation for success. One positive note for my husband and I was that no walks equaled more free time. I had felt that it was important for Taxi’s well-being to be walked every day. Now I could use other tactics to get him mental stimulation.

No walks meant I was able to go back to the ABC’s - Antecedent, Behavior, Consequence. I had the power to change the antecedents. Instead of already taking an excited and anxious dog, I could work on being calm when the leash was present. I could limit the distractions in the environment if we were not

even leaving the house. Taxi progressed quickly to being able to put his harness on while he was sitting calmly.

Once I had mastered putting on the harness and leash, I progressed slowly with the rest of the steps. Taxi was to sit calmly while opening the door. Then we moved on to going into the garage. Taxi was to connect with me before we moved to the next step of walking in the driveway. We spent months doing laps in the driveway. Taxi was improving on looking to me for direction and staying connected. The driveway laps provided opportunity for distractions with the ability to escape to a safe place - the garage or house.

The walks in the driveway gave Taxi some exercise and mental stimulation. At times this was not enough. During these times I would provide enrichment for both of the dogs. I to this day do not understand why as a zookeeper I did not think too much about giving enrichment to my dogs. I began giving them treat boxes, Kongs, and puzzle feeders. I also began making them forage for their diet. Foraging was Taxi's least favorite enrichment. The enrichment made both dogs calmer in general and easier to train.

Focus

In order for Taxi to be successful out in the neighborhood, he needed to connect with me mentally. That connection allowed him to look at me for further instructions. It allowed me to give him the feedback he needed as we walked. Walking laps in the driveway gave me the perfect opportunity to train this. The connection would begin as I put on his harness. Once we were outside the door, he would connect with me again. As we did the laps, I would change directions. This encouraged Taxi to keep an eye on me and to check in with me. When Taxi checked in with me frequently, I would start to walk beyond the driveway to the houses next door.

Premack Principle

Now that I had a calm and connected dog, the training could progress. The trainer wanted to continue to have Taxi check in with me. She also wanted to ensure that we were building confidence. The Cue-Response-Reward technique was effective in building confidence in the stable environment of the house. Now we would use a similar technique called the Premack principle. I had heard of the principle but had not called it by that title.

The Premack principle states that a high probability behavior reinforces a low probability behavior. For example: I ask Taxi to sit calmly when near a good smelly object. This is the low probability behavior. Without training, Taxi would go sniff the object for as long as he wants whenever he wants. Sniffing the object is the high probability behavior. Now I ask Taxi to sit calmly near the good smelly object. If he sits, then getting to sniff reinforces the sit. If he does not sit, we do not go near the smelly object.

The Premack principle allowed me to use reinforcers other than food. This was particularly helpful when Taxi was too excited to accept treats. I could keep the food in the training pouch and focus on the behaviors. A particular treat held it value longer allowing me to reduce the trips to the dog supply store to find something else favorable.

Keep Calm

The trainer had us revisit getting Taxi into that positive emotional state. For this we were going to use mindfulness. I was to train Taxi to lay on his side and "chill out". Relaxed face and ears and deep inhalations was the criteria I was looking for. Taxi would lie on his side but he was always tense waiting for the time when he could get up. The longer I waited to look for those relaxation cues the more tense Taxi got.

Since "chill out" was unsuccessful, I tried other ways to get Taxi calm. When Taxi would lie down sternal I could get the same effect. Taxi would lie sternal and I would wait for him to shift his hip to one side in a more relaxed position. We would hang out like this until I could see more of Taxi's body relax. Once he relaxed we could move on. This technique worked well between high excitement episodes. I could bring Taxi to a relaxed, calm state and then continue on with our walk after an encounter with another dog.

Now that I had Taxi relaxed and below his threshold, I wanted to keep him at that state. As we

walked, I kept an eye out for opportunities to work on increasing the level that was his threshold. The most successful exercise for this was Behavior Adjustment Training (B.A.T.). For this exercise the trainer stops below the dog's threshold and waits for a positive behavior. Once the dog does the positive behavior, the trainer moves the dog away rewarding him as they go. This was helpful when Taxi would be too nervous to take treats. As we moved away from the stimulus, Taxi would be in a better state to take treats.

Working on keeping Taxi calm was a good reminder to evaluate the emotional state of my animals at work before starting a training session. It is much easier to set up an animal for success when they are calm and open to training. They also are more open to learning. This is a win-win situation for all parties.

Taxi is not the only one that needed to be calm. There would be a much better outcome when I went into the walk or training session calm and composed. I worked on taking deep breaths and be mindful of my emotional state. When I would see other dogs I would begin chanting "we got this" in my head to increase my confidence level.

The trainer observed that as I got more nervous, my hand holding the leash would drift up towards my shoulder. She used TAGteach to help me work on my hand position. TAGteach is a technique used for humans. A tag point is determined for the human. It is then bridged like an animal's behavior. The tag point was having my hand at my belly button. It only took two sessions to make me more aware of where my hand was. I now can feel my hand creeping up as I get nervous and can readjust my emotions.

Mix and Mingle

Throughout this process, I learned quite a bit that is valuable at home and at work. It is ok to admit failure. This allows us to learn from our mistakes. Just because I am a "professional" does not mean that I have it all figured out, especially in training. The principles are the same but the techniques are different. In either case, I can always go back to the basics.

The lessons I learned using dog training techniques can apply to the zoo world. How I enter a training session influences the outcome. At work, I did the training sessions when I had time and did not pay much attention to my mood and energy level. That has now changed. I am conscious of my state of mind before entering a session.

I now also pay attention to the emotional state of my animals. I read their body language before the training session and also throughout. I can pick up the subtle signals that can tell me I can push forward with a behavior or maybe take a step back. I can also see how they are responding to my body language.

This level of communication has become essential to helping me work in more fluid environments especially in free contact. As I am tuned into what my animal is saying, I can make adjustments for changes in the external environment. It is hard to focus on your animal and what is going on around you. When you are taking cues from your animal the need to know exactly what is going on around you diminishes. Now, it matters how the animal is responding to the distractions and how to work around that reaction.

My Next Ride

Training and learning are dynamic process. There is not a beginning and end. The same goes for my ride. I am continuing to learn with Taxi and with every animal I train. I have a few other animals at home to work with and of course always new challenges at work.

My ride for the future is packed with all the tools I have learned from this ride. I am sure that I will also find my way on the scenic route as I like a good challenge to learn from.

Can You See Me Now? How About Now?: A Collaborative Effort to Increase On-Exhibit Visibility of 1.1 Lions at the Oakland Zoo

Heather Paddock and Erica Calcagno

Oakland Zoo

After the loss of Oakland Zoo's four elder lions in 2010 the ~1.5 acre exhibit was now very spacious, had plenty of resting places, and often had the two remaining lions "out of view" for the general public. By 2013, after many guest complaints, it became clear that something should be done to increase the visibility of Oakland Zoo's remaining lions. Rather than struggle through such a huge endeavor alone as an individual keeper or string, the Lion Team took a different approach. A major collaborative brainstorming effort was undertaken with the support and involvement of multiple Zoo departments from the President & CEO, to PR and Marketing, to the entire Animal Care Department. This concerted brainstorming effort has produced over a year of productive project ideas. Simultaneously, a behavioral observation project was implemented to ascertain how often the lions were "not visible" and if the lions were adhering to a roughly naturalistic behavior pattern. This observation project took advantage of Oakland Zoo's established intern program. In considering the brainstorming results and observational data it was important to balance guest interests vs encouraging natural behaviors and to have any management changes accomplish both these objectives. Major management changes do not have to be on the shoulders of a single keeper; the process can be collaborative and integrate ideas from individuals with a variety of backgrounds and knowledge bases. Both keepers and their animals can benefit from an open and collaborative approach to management.

Through The Lizards Eye – A Behaviourist Approach to the Diagnosis and Treatment of Behaviour Problems in Companion Lizards

Danielle Middleton-Beck

My Pet Guardians

The keeping of lizards as companion animals, by the general public, has risen in popularity over recent decades with many companion lizards being viewed as 'easy to care for when compared to other companion animals' (CAWC 2009), and are seen as having limited intelligence. Therefore, many companion lizards are housed in minimalistic enclosures where convenience and simply keeping the animal alive is the main priority. This is in contradiction to how many lizards are housed in zoos, particularly those kept on display, which are housed in more naturalistic and enriching enclosures which cater for both physical and psychological health.

Due the limitations of being ectothermic, lizards kept as companion animals are reliant on their enclosures for their physical and psychological health. The inability to perform natural behaviours or cope with the stressors placed upon them when housed in minimalistic enclosures, as companion animals, often leads to the development of behavioural problems in captive lizards, including aggression, repetitive behaviours and feeding problems.

Many lizard species are kept as companion animals. Their rise in popularity over recent years is thought to be due to increasing availability, diversity and apparent ease of care, when compared with other companion animals (CAWC. 2009). Lizards naturally occupy a large range of environments, often exploiting particular niches within those environments, and evolving to thrive in those conditions.

Despite the range of complex natural environments, many companion lizards are often considered to have limited intelligence. Therefore, they are housed in minimalistic enclosures where convenience and simply keeping the animal alive are the main priorities, rather than the lizards' psychological welfare. This is in contradiction to how many lizards are housed in zoos, particularly those kept on display, which are housed in more naturalistic and enriching enclosures meeting their ethological requirements.

Lizards kept as companion animals are reliant on their enclosures for their physical and psychological health, due to the limitations of being ectothermic. The difficulty of replicating wild environments to promote 'optimal stimulation' in captivity, often results in prevention of normal behaviours, such as hunting and macro-habitat investigation through an adequate spatial range (Warwick, et al. 2013; Burghardt, 2013). This prevention of performing normal behaviour, may result in behaviour problems, which include:

- Human-directed aggression,
- Co-occupant aggression,
- Repetitive interactions with boundaries,
- Abnormally increased activity,
- Abnormally decreased activity,
- Anorexia,
- Residing in A-typical locations.

Their inability to cope with the stressors placed upon them when kept, as companion animals are some of the biggest contributing factors to the development of behaviour problems in companion lizards,

closely combined with early experiences (Harvey-Clark, 1995; Greenberg, 2002; Swaisgood and Shepherdson, 2005; Warwick et al. 2013).

An individual's environment and early experiences exert a strong influence on their future behaviour (Sih, 2011). Those lacking appropriate early experiences are more likely to develop behaviour problems in adult life (Mason et al., 2013; Clark et al., 2014). Genetics and a poor breeding and rearing environment can affect a lizard's behaviour, cognitive abilities and their overall ability to cope with stress (Fone and Porkess, 2008; Shi, 2011; Baarendse et al., 2013; Clark et al., 2014). Enriched environments can increase a lizard's ability to learn and cope with changing environments, (Ameil and Shine 2012; Mason et al., 2013; Burghardt, 2013). Whereas, those raised in barren environments, with little exposure to novelty and enrichment, will be predisposed to develop behaviour problems later in life. Therefore, early life experiences can affect the immediate, and shape the future ability of an animal to cope with stress (Sih, 2011).

When a behaviour counsellor is presented with a behaviour problem, a procedure of behavioural diagnosis needs to take place. This is to ensure the correct behavioural diagnosis and treatment plan is recommended. The behavioural consultation includes:

- Veterinary check – To ensure there are no medical reasons causing or exacerbating the behaviour.
- History – Questionnaire – To collect basic information about the animal's acquisition, living conditions, diet and the problem behaviour.
- History – Consultation – A non-judgemental human centered consultation, which allows the counsellor to refine the information gathered to build a timeline in the life of the animal. This enables the behaviourist to ascertain any predisposing, initiating and maintaining factors related to the behaviour.
- Behavioural Diagnosis
- Client Education – Explain to the client how the problem has developed and how we can work together to help the client and animal, taking into account any limitations, with regards to the environment and lifestyle of the client. It's the role of the behaviour counsellor to not only help the animal, but to help their caregivers to understand their animal.

Case Study – Monty - Savannah Monitor - Caregiver aggression

(Stiffening, hissing and striking at his caregiver)

Differentials – Caregiver aggression

These differentials are some of the possible reasons for a lizard to display aggression towards their caregiver:

- | | |
|-------------------------------|--|
| • Organic medial causes | • Effect of early experiences |
| • Genetics | • Learning |
| • Hormonal | • Fear aggression |
| • Predatory | • Defence |
| • Dominance | • Stress |
| • Resource guarding | • Enclosure stress – Size, Temperature, Humidity, Substrate, Enclosure furnishings |
| • Territorial aggression | |
| • Effect of early experiences | |

It is the role of the behaviour counsellor to work out which of these are having an affect on the behaviour during the consultation process, taking into account the caregivers limitations, lifestyle and en-

environment. This will enable the behaviour counsellor to formulate a diagnosis and treatment plan, as there are no 'one size fits all approaches', each case needs to be treated on an individual basis.

Unfortunately, the caregiver's first port of call is often to ask the Internet (or "intervet") for advice. Some recommendations commonly seen on reptile forums and groups include:

- *"Throw a towel over them and hold them until they calm down, so they learn you're not a threat"* – This often results in the lizard remaining still, in a state of 'freeze', or learned helplessness, which are both high states of stress that are commonly mistaken for the animal being calm.
- *"Hand feed them"* – This is well meaning advice and can be beneficial in some cases to help the animal to associate the caregiver with something good. However, it can also create a stressful state of conflict where the lizard wants to approach for the food, but is scared to do so. This can further increase stress, particularly if food is restricted and only available via this method, leading to further problems.
- *"Cool down their vivarium's, so they don't attack you"* – For an ectothermic animal, this is no different to being held by a physical restraint, with the animal being unable to move or avoid the situation.

The general emphasis is on punishing or stopping the behaviour (symptom), not treating the cause.

History – Monty

- 8 month old, male, Savannah Monitor.
- Owner acquired him from a pet shop when he was 6 months old.
- Lives in a 7ft x 4 ft x 4 ft wooden enclosure, with lots of hides, deep soil/sand substrate and good temperature gradients & humidity.
- Fed a variety of invertebrate live food within the enclosure.
- Will puff out and hiss at his owner, only when they move their hand to reach for him.

Diagnosing process

Pre disposing factors – Savannah monitors are a prey species and are naturally weary, particularly towards aerial predators. Acquired from a pet shop, which bought them in as captive farmed. Therefore, a possible genetic element cannot be ruled out. The early environment may have also resulted in a predisposition towards inability to cope with stress, as he was most likely not introduced to large amounts of novelty or careful handling, in his early development.

Initiating factor – Inherent fear of being grabbed combined with previous aversive handling experiences and associated learning.

Maintaining factors – Learned association between aggression and threat reduction, through negative reinforcement.

Differentials – Caregiver aggression – post consultation

After the consultation, we can see that Monty's aggression towards his caregivers may have a genetic element and is the result of poor handling from an early age, which caused an increase in stress and fear. This has resulted in Monty defending himself, which has been reinforced by people moving away when he displays this aggressive behaviour.

- | | |
|---|--|
| ☐ Organic medial causes | ☐ Genetics |
| ☐ Enclosure stress | ☐ Effect of early experiences |
| ☐ Territorial aggression | ☐ Fear aggression |
| ☐ Predatory | ☐ Defence |
| ☐ Dominance | ☐ Learning |
| ☐ Resource guarding | |
| ☐ Hormonal | |

Treatment plan

Now we know what caused and is maintaining Monty's aggressive behaviour we can formulate a treatment plan to reduce his stress. This will reduce his requirement to defend himself by changing his emotion and then teaching him that hands are not something to fear.

1. Environmental management – Reduce stress and increase mental stimulation. To reduce the aggressive response we need to give Monty a 'stress break' where the caregiver would not put their hands in his enclosure or move towards him. This will make Monty's aggressive response irrelevant. The introduction of novel items, digging spaces, hiding spaces and feeding toys aids in environmental enrichment and reduces stress. As Savannah monitors are a naturally foraging species, they are able to search and track prey over a wide distance, or investigate objects to find their prey (Mendyk & Horn, 2011). Increasing the physical complexity of environmental enrichment can reduce the fear responses and reactivity to acute stressors too (Meehan and Mench, 2002). Hiding food in creative ways is a great way to enrich a monitor's environment.

2. Change the emotion – Respondent conditioning based programs can be used to change the conditioned emotional response shown by Monty towards his caregivers hands (Lindsey, 2005). The use of desensitization and counterconditioning will help to increase the bond between caregiver and lizard, by reducing the fear associated with the caregiver. This process is very systematic, with the caregiver remaining away from the enclosure, gradually moving closer overtime until Monty is happy to eat in the caregiver's presence. Tongue feeding can then be used to increase this association.

Monty will soon start to form a new association between the caregiver and enrichment items, changing the emotion from caregiver = fear, to caregiver = pleasure through classical counterconditioning.

3. Change the behaviour – The operant part. Positive reinforcement training has been shown to reduce fear aggressive behaviours and is associated with fewer behavioural problems (Arhant et al 2010). The caregiver can then start to reinforce desired behaviours like remaining calm, through the use of positive reinforcement.

Conclusion ethology – know your species!

The welfare of a companion animal is mostly reliant on its early experiences and its environment. Ensuring they have an adequate enclosure for their species, which is enriching and promotes natural behaviour, is essential for their welfare and the prevention of behaviour problems.

References

Amiel, J. J., & Shine, R. (2012). Hotter nests produce smarter young lizards. *Biology Letters*, 8, 372-374.

Arhant, C., Bubna-Littitz, H., Bartels, A., Futschik, A., Troxler (2010) Behaviour of smaller and larger dogs: Effects of training methods, inconsistency of owner behaviour and level of engagement in activities with the dog. *Applied Animal Behaviour Science* 123, 131-142

Burghardt, G.M., (2013) Environmental enrichment and cognitive complexity in reptiles and amphibians: Concepts, review, and implications for captive populations. *Applied Animal Behaviour Science*, 147 286–298

CAWC 2009 Companion animal welfare assessment CAWC London

Clark, B.F., Amiel, J.J., Shine, R., Noble, D.W.A., Whiting, M.J. (2014) Colour discrimination and associative learning in hatchling lizards incubated at ‘hot’ and ‘cold’ temperatures. *Behavioural Ecological Sociobiology*, 68:239–247

Fone, K. C. F., & Porkess, M. V. (2008). Behavioural and neurochemical effects of post-weaning social isolation in rodents: relevance to developmental neuro- psychiatric disorders. *Neuroscience & Biobehavioral Reviews*, 32, 1087-1102.

Greenberg, N., (2002) Ethological Aspects of Stress in a Model Lizard, *Anolis carolinensis*. *Integrated and Comparative Biology*, 42:526–540

Harvey-Clark, C.J. (1995) Common Dermatologic Problems in Pet Reptilia, Seminar~ in Avian and Exotic Pet Medicine, 4, 4 pp 205-219

Lindsay, S. R. (2005) Handbook of Applied Dog Behaviour and Training: Volume Three – Adaptation and Learning. Iowa State Press.

Mason, G., Burn, C.C., Dallaire, J.A., Kroshko, J., McDonald Kinkaid, H., Jeschke, J.M., (2013) Plastic animals in cages: behavioural flexibility and responses to captivity. *Animal Behaviour*, 85 1113e1126

Mendyk, R.W. & H.-G. Horn. (2011) Skilled forelimb movements and extractive foraging in the arboreal monitor lizard *Varanus beccarii* (Doria, 1874). *Herpetological Review*, 42(3): 343-349.

Meehan, C.L. and Mench, J.A. (2002) Environmental enrichment affects the fear and exploratory responses to novelty of young Amazon parrots. *Applied Animal Behaviour Science*, 79:75-88.

Sih, A. (2011) Effects of early stress on behavioural syndromes: an integrated adaptive perspective. *Neuroscience and Biobehavioral Reviews*, 35, 1452e1465.

Swaigood, R. R., Shepherdson, D. J., (2005) Scientific approaches to enrichment and stereotypies in zoo animals: What’s been done and where should we go next? *Zoo biology*, 24:499-518

Warwick, C., Arena, P., Lindley, S., Jessop, M., and Steedman, C., (2013) Assessing reptile welfare using behavioural criteria. *In Practice* March 35 123-131

Training Raptors Force Free and Without the Use of Equipment

Carina Soegaard Ellebaek

Ree Park Safari

Training raptors is a field where there is still a lot of new things to discover. Until today, the most common way to train raptors is with equipment often followed by the use of force in some way. In Ree Park Safari we had trained raptors for 9 years this way, until in 2012 we decided that it had to be possible to do it without equipment and the use of force. We decided to remove the equipment, work with them force free, and with the aim of positive reinforcement. This off course did not happened in one day. We used a lot of time planning how to approach this goal, without compromising the safety of our raptors. Today we train hawks, owls, and a falcon without equipment, and all of our birds are free lofted. We are also expanding our way of training raptors, by training behaviors we would never train before, like getting a hawk to put its head into an anesthesia mask. I will tell our story, show what we have done, what challenges and successes we have had. It is my hope that I can inspire more trainers to venture this way, and that we with time will get more experience in a field where there is so much more to learn.

An African Adventure: Raising Awareness through R⁺ Training Methods

Barbara Glatz

Animal Training Center

The Animal Training Center has been dedicated to wildlife education and rescuing animals since its beginnings. Wanting to share our experiences in training people and animals, we started a cooperation with a long-established private wildlife rehabilitation centre in Tanzania, Africa.

In a very different culture where empathy and compassion along humans are not priorities, it is even harder to find those characteristics when it comes to animals. The first big challenge was showing people that animals have feelings and need appropriate care to survive and thrive. Increased human-wildlife conflicts due to habitat loss made it even harder when we tried to emphasize that wildlife and nature are important.

New challenges arise every day: working with employees and students on the farm and informing the police about positive ways of training their animals turned out to be a very difficult attempt. To overcome those problems we had to start to think the same way they do. How can people benefit from acknowledging feelings of animals? How can we overcome their lack of compassion? We found that it worked the best through getting themselves involved emotionally - building relationships with individual animals and training them through positive reinforcement training methods. The results are astonishing! The people involved experienced a whole new world which is characterized by trust, empathy and understanding. These are qualities they often can't even find within their families. The interest and enthusiasm we encounter is very touching and encourages to continue with our work despite all defiances.

The Kilimanjaro Animal C.R.E.W. is an NGO situated on the southern slopes of Mt. Kilimanjaro in Tanzania. Its base is at Makoa Farm, which is run by two German vets. Tourists can come here to spend some time on the farm or to go on horseback riding safaris. Additionally to the tourist business they run a private wildlife sanctuary where they raise and rehabilitate animals to be released into the wild again.

Those animals that cannot be released anymore out of different reasons participate at the various educational programs offered by the Kilimanjaro Animal C.R.E.W. Most of those programs address children and teenagers but there are also some for adults, such as teachers, employees of the Tanzanian Wildlife Research Institutes or the animal trainers of the police.

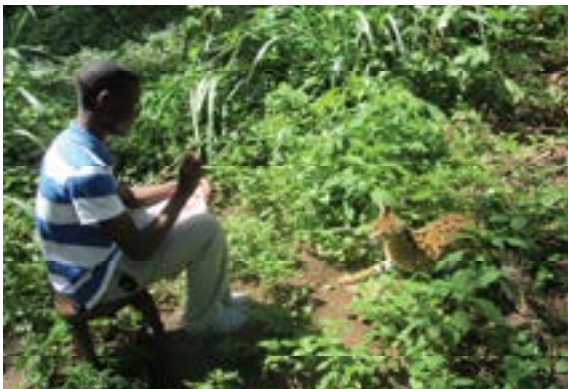
In my presentation I was talking about two projects: the Bush School and the training of the police animal trainers.

Bush School

Although most Tanzanians belong to one of the world religions natural believes are still very widespread creating myths, which endanger several animal species. With a compulsory schooling system based on P⁺ methods and with a culture that sees animals as living meat without feelings it is not surprising that there is a big lack of trust and compassion throughout the society.

The programs in our Bush School focus on educating students towards conservation, understanding nature and handling and caring for animals using various lectures and activities. In addition to that we found another unique approach: we use R⁺ training methods to have the students interact with our animals. That

gives them the chance to see animals through different eyes and it shows them a completely new way of learning, cooperation and trust. By experiencing that the animals want to cooperate and by getting feedback from them students learn about an animal's characteristics and personality. It even helps to eradicate myths by interacting with the specific individual experiencing that nothing bad happens. Our Bush School started about 3 years ago and its success is revealed by several touching moments. About a year ago students brought us a young and deserted duiker to care for. Before attending the Bush School they would have killed it instead. Recently a very happy lady told us that her husband had decided to stop hunting bushbabies every night because the son, who had visited the Bush School, had refused to accompany him anymore.



Training with the police

We got involved into the training of the police dogs and horses because we were called to help an injured mare. When we arrived at the police academy, where they also keep many of their dogs and horses, we were shocked about the condition the animals, especially the horses, were in. They were starved, without water and scared. When one of the trainers explained to us that one of the horses had so many injuries because they had to remind her again how to be trained, we decided that we needed to do something. We

convinced the horse trainers to visit our horses and us to see how healthy and well-kept animals should look like. Only after that visit did they start to understand that they are doing something wrong. They became very interested in what they could learn from us. They also told the dog trainers about what they experienced at Makoa Farm and they were very eager to learn something new as well.

We started a holistic training program consisting of three major parts:

- How to care for animals
- Appropriate equipment
- Training with R+ based methods

We explained how and what to feed the animals and trained them how to care for the horses' hooves. We also made sure that the horses are able to run around the compound on a daily basis.

The equipment for the horses is about 60 years old and using it causes many injuries. There is no official funding for new things, so we started a collection among our supporters to sponsor us their old saddles, blankets, belts, etc. Within few weeks we received a lot of equipment that makes the horses lives already a lot easier.

We started to change training from using P+ based towards R+ based techniques in small steps. At first we gave an introduction about what the training should be like to get good performance and a trusting animal-human relationship, then we let the trainers work with our animals and gave them riding lessons on our horses. Before we let them work with their own animals we hold a seminar with chickens. By training chickens the participants learnt how to use a marker signal and R+ techniques without confusing their own animals. Only after they could gather some experience this way we started to train their animals. We introduced the clicker to the dogs and we also explained them how to start training with their puppies that used to stay in their kennel until they are 6 months old.

We had leading workshops with the horses and finally gave riding lessons on their own horses. The success was incredible. Trainers and animals were highly motivated and soon we could see changes in every direction – the nutritional status improved visibly, the animals showed less anxiety related behaviors, and the communication between animal and trainer became clearer and friendlier.

Those two projects are ongoing; both won't be finished anytime soon. Seeing the results of the work and the enthusiasm of the students and the policemen motivates us to continue despite all challenges.





Using Behavior Management to Help Regulate a Diabetic Golden Lion Tamarin (*Leontopithecus rosalia*)

Jennifer Hennessey

Roger Williams Park Zoo

*I had contemplated injection training with our callitrichids for years but could never justify the time and effort I thought would be necessary to achieve a behavior I may or may not use. When our female golden lion tamarin (*Leontopithecus rosalia*) was diagnosed with diabetes in January 2014, it became necessary to develop a behavior management plan that included hand injections to manage her illness. I will discuss the changes we made to her exhibit design, social grouping, and nutrition as well as the steps taken for urine collection and injection training that have led to a significant decrease in her glucose levels. While I had theorized it would take a significant amount of time to injection train any of the callitrichids, in actuality it took just 28 days.*

Introduction

I am guilty of labeling, making excuses for why it just was not worth training the injection behavior to our collection of callitrichids. Even though I knew other institutions had been successful at training this behavior, I still could not imagine dedicating the time and effort I assumed was needed in order to be successful. Sometimes it is necessary to triage the behaviors you intend to train, especially when you have multiple animals on a run to care for. If you decide to train a single animal a behavior that is very time consuming, it will eventually affect the other animal's behavior management.

I was not aware I was labeling. Examples of labeling I had heard in the past included this animal is too old, scared of men, or just stubborn to name a few. I thought I was using my animals individual history as well as natural history to guide my decision making process. This is a common practice when planning out both training and enrichment programs using the SPIDER model. A first step of SPIDER is Setting Goals. It involves using knowledge of the animal's natural and individual history to generate ideas about behaviors that we might want to encourage.

In regard to natural history, according to Kleiman and Rylands (2002) golden lion tamarins are preyed on by raptors, snakes, and small arboreal carnivores. If you think about it there is a potential predator from above, below, and right where you are if you are a golden lion tamarin (GLT). Just sitting back and observing GLTs you can see a heightened sense of awareness of their surroundings. They are constantly turning their heads in every direction scanning their surroundings. I just could not visualize any of our callitrichids coming down to a keeper, sitting still, and allowing us to inject a needle into them.

I also took into account the animal's individual history. In this case it was our GLT Peanut. Peanut from birth was a nervous individual. Sudden movements would send her retreating in the opposite direction, just looking at her sometimes sent her fleeing to the top of the enclosure. Out of all the callitrichids we had at Roger Williams Park Zoo, Peanut would definitely not be my first choice in attempting the injection training behavior. Based on both the natural history of the species and Peanut's individual history I just could not justify the time and energy I assumed it would take to train the injection behavior, a behavior that I may or may not even use.

Spoiler alert, Peanut was injection trained in just 27 days. This paper is not just about injection training. I will take you through the steps I used to train this behavior, as well as all of the other behavior management strategies we implemented to help regulate her disease. Mostly, I want to emphasize the epiphany I had come to learn about labeling and making excuses for years. We currently are not

using insulin injections to help regulate Peanut's diabetes. We changed her diet and started her on oral medication that has significantly decreased her glucose levels. However, we have the injection behavior if we need it in the future, and a new found confidence going forward.

Peanut

Peanut was born September 27, 2003. She was parent reared, had a sibling sister, and a pretty average life of a GLT. There was one characteristic about Peanut that always stood out. Peanut was always a large girl, even reaching over 1 kg during part of her life. This is significantly higher than the average wild GLT's weight which is around 500 to 600g.

For several years she lived in a mixed species exhibit with a Prehensile Tailed Porcupine (*Coendou coendou*), and her mate, until June 2013 when her mate died.

A diagnosis of diabetes was made in January of 2014. Hyperglycemia (402 mg/dL) was noted during a routine physical examination and repeated urine glucose readings from free-catch samples were markedly elevated (>1000 mg/dL). Clinical signs of weight loss and mild lethargy were also observed at this time. Blood glucose had been elevated to a lesser degree at the previous two routine examinations but was attributed to a stress hyperglycemia.

Methods

Behavior management

After the diagnosis of diabetes, several husbandry changes that needed to occur were identified. They included: Changing her enclosure, changing her cage mates, changing her diet, injection training, and urine collection training.

Social grouping and increased enclosure size

Peanut had lived as a single primate in her enclosure for 7 months before her diagnosis. Living adjacent to her, with visual and auditory access lived a single white faced saki monkey (WFS) (*Pithecia pithecia*). Even though they are different primate species it was decided that it could be beneficial for both individuals to live in the same enclosure. The WFS enclosure also houses a silver beaked tanager (*Ramphocelus carbo*). We moved the prehensile tailed porcupine that already lived with Peanut into the WFS enclosure as well. We hoped the new mixed species exhibit would provide stimulation and perhaps social benefits to the primates. The following September 2014, we added 3 pygmy marmosets (*Cebuella pygmaea*) to the enclosure.

When we moved Peanut into the new mixed species enclosure it doubled her living space. She went from a ~3000 sq feet to a ~6000 sq feet enclosure. Anecdotally I have experienced and heard from others that animals seem to have more confidence and seem to become calmer when given a larger enclosure space.

Nutrition

On February 15, 2014 we started to convert Peanut to a low sugar diet. Peanut's original diet can be broken down into three parts. The Mazuri callitrichid gel# 5MI5 was the bulk of the diet. She also received a rotation of fruits, vegetables, and insects on a daily basis. Lastly, she received a novel food item daily that was chosen by the keepers. The Mazuri callitrichid gel# 5MI5 is a powder. When hot water is added, and then the mixture is chilled in the refrigerator, it forms a gel. Mazuri makes a callitrichid gel specific for diabetics called callitrichid gel no sugar added #592Y. In our first attempt to transition Peanut from the regular callitrichid gel to the low sugar gel, we made two separate gels independently and offered them both to Peanut in the same container. We were hoping to increase the low sugar gel portion and eventually wean her of the regular callitrichid gel. This method failed. She would pick out the low sugar pieces and throw them on the floor and only consume the regular gel pieces.

On March 12, 2014 we changed our method to transition the diet. Since both gels originate in a powder form we mixed the regular callitrichid and the low sugar powders together and then added the water. We slowly increased the percentage of low sugar powder until it was fully converted. This method

worked better but we still encountered problems. Peanut did not seem to like the taste of the low sugar gel. She was observed on several occasions attempting to obtain the Zupreem canned primate diet out of the WFS diet. The WFS diet was placed in a plastic gourd suspended by a length of coated wire. She would work very hard to procure the canned primate diet. The keepers eventually found a few places in the enclosure where the WFS diet could be hung where it was nearly impossible for Peanut to get the diet but the WFS could still reach it.

Peanut's daily fruits were assessed for high sugar content and changed out for lower sugar vegetable items that she has been known to enjoy. This included cooked carrot, yam and corn. Her novel food items and insects remained unchanged since their amounts were a small portion of the diet.

We also had some unexpected setbacks. By March 15, we were a quarter of the way through the gel transition process 25% new 75% old. On April 3, 2014 our commissary ran out of low sugar gel. We had to start the conversion process over again once the product arrived at the zoo.

We had to reevaluate her diet once again once the pygmy marmosets were added to the enclosure. The marmoset's diet still had the regular callitrichid gel in it as well as Zupreem canned marmoset diet. We started the conversion process for the pygmy marmosets to the low glucose gel but we kept the canned marmoset in the diet. Once again Peanut and the three marmosets were seen throwing the low sugar callitrichid gel on the ground and only consuming the canned marmoset diet. We are now pulverizing the canned marmoset diet and mixing it in with the low sugar gel before adding the hot water to form the gel and only offering the combined mixture. This seems to make the low sugar gel more palatable to all the monkeys involved.

Injection training

In October I met with the veterinary staff and we both decided it was a good time to reevaluate injection training Peanut in case we needed to regulate her using insulin injections. My animal care manager and I brainstormed together and she offered the idea of building a PVC tube similar to the one used in otter training. To construct the tube I used a 7.62 cm diameter PVC pipe that was cut to 15.24 cm long. I cut the pipe in half-length wise and zip tied a piece of mesh over the opening. This created a barrier that placed Peanut in a position that exposed her outer thigh in a way ideal for injections. It also provided a barrier between the keeper and the monkey for safety since Peanut is housed in a free-contact exhibit.

The reinforcement used was low-fat flavored yogurt in a syringe. Peanut had learned to take liquids from a syringe years earlier to take medications. She has always been very eager to receive juice and yogurt with this method. Dispensing the reinforcement from a syringe was ideal because we could lengthen the time and amount of reinforcement without removing our hand.

On October 17, 2014 we introduced the tube to Peanut. We placed the tube on a flat platform that was at chest height for the keepers and a spot that Peanut was already comfortable going to. The tube was secured in place with zip ties and made a permanent fixture in the exhibit. On the day of placement of the tube, we baited Peanut with the syringe through the mesh. We were able to get her half way into the tube comfortably on the first day.

On October 21, she was quickly going into the tube and I introduced touching her thigh with my finger. She did not tolerate this well and immediately left the tube. It took 3 days for her to be desensitized to touching her thigh while in position in the tube.

On October 28, we started putting pressure on her thigh with a blunt needle.

On October 29, I had our veterinary technician observe one of Peanut's training sessions. At this point I was not sure if we should add a second trainer, one to reinforce Peanut and one to give the injection. It was decided that I could proceed with one trainer, rewarding Peanut with one hand and inject her with the other.

On October 30, I realized that I needed to have Peanut's fur trimmed so I could see her skin on her thigh better for the injection process. I started trimming her hair opportunistically while she was in the tube. I trimmed her hair once on October 30 and again on October 31.

On November 11, I poked her with a 28 gauge insulin needle. She did not react.

On November 13, I injected her with 1 unit of saline. Since we are not currently medicating Peanut

with insulin injections, I continue to medicate her orally in the tube while I apply pressure with a blunt needle on her thigh. Infrequently I will use an insulin needle to make sure the behavior is solid.

Medication

On November 28, we started Peanut on glipizide. Glipizide is an oral diabetes medicine that helps control blood sugar levels by helping the pancreas produce insulin. Glipizide is used together with diet and exercise to treat type II diabetes in humans.

Peanut has never had an aversion to the taste of the glipizide, which is compounded by a local pharmacy into a liquid with no added flavors. She has taken it from a syringe on its own but takes it best when mixed with a small amount of yogurt (1 to 2 ccs). I started placing the glipizide in the syringe with yogurt and used it as the reinforcement for correct behavior during her training.

Urine collection training

We monitor Peanut's glucose levels through her urine using urine glucose test strips (URS 1G urine reagent strips). Our vets requested we provide a urine sample at least one to two times a week. In order to do this reliably and in a timely manner we needed to train Peanut for urine collection.

To set Peanut up for success to learn this behavior I attempted to increase her fluid intake first thing in the morning right after her injection training. At first I tried to offer water to her in a syringe. She did not care for this. I started pairing the water in a syringe to earn a wax worm. It was working but I was only getting a few drops of water in her for each wax worm paid. I started mixing 3 parts water to one part apple juice in a 3 cc syringe. This method worked much better and I was able to get her to take the full 3 ccs faster. I would revisit Peanut after an hour and a half or so and attempt to capture urine. I had a small plastic cup that I would hold beneath her and say "peepee". Opportunistically I would capture her urination and reward her with insects.

Results

Social grouping and increased enclosure size

Peanut's confidence and willingness to interact with the keepers seemed to increase dramatically when we moved her into the new larger enclosure with new cage mates and changed her diet. She would come down to the keepers as soon as they entered the enclosure or was often found waiting in the area where her training occurred. Anecdotally, while Peanut and the WFS did not seem to interact with each other, it appears the addition of the pygmy marmosets increased Peanut's wellbeing. On several occasions the marmosets have been observed grooming her.

Nutrition and medication

Peanut's diet conversion was a very bumpy process. After several attempts to transition her to a low sugar diet we finally started to see results on Nov 4, 2014. Her glucose levels started to decrease from 1000+ mg/dL to around 250 mg/dL. We started her on the oral medication of glipizide on November 28, and continued to see a downward trend in her glucose levels. Now they are consistently around 100 mg/dL. Since we started the glipizide we had one increased reading of glucose between 100 and 250mg/dL. However we also had 2 readings between 0 and 100 mg/dL and two negative readings.

Injection Training

Despite the hypothesis that it would take a great deal of time to train the injection behavior to Peanut, it took just 27 days. We decided not to proceed with insulin injections due to the success in the decrease of glucose in her urine with the diet change and the oral medication glipizide. We were concerned starting insulin injections might send her glucose levels too low and possibly into insulin shock.

Urine collection

Peanut's urine collection training is ongoing. It is still not under stimulus control. I am able to procure the two samples the veterinary staff requires because I have gotten better at anticipating when

Peanut will urinate.

I have observed if Peanut has been resting for a longer period of time she will usually come right down when asked and then urinate. I can retrieve my sample for the veterinary staff and continue to reinforce her and try to establish it as a behavior.

Other medical

On Dec 27, Peanut would not come down to participate in her training or take her glipizide. This was highly unusual for her at this point in time. She seemed lethargic and would not move from a hollow log high up in the enclosure. By midmorning we decided to catch her and bring her to the veterinary hospital. Peanut was anesthetized for a full physical examination, radiographs, and bloodwork to rule out many potential causes of her clinical signs, including too low or too high blood sugar (hypo or hyperglycemia). When we removed her from the kennel she did not resist or struggle while in our hands. However her blood glucose was 129 mg/dL, which is almost a normal blood glucose level.

A cataract in the right eye was found during the examination. This is a common side effect from diabetes. A cataract is a clouding or fogging of the normally clear lens of the eye. Although anyone can get cataracts, people with diabetes get these eye problems at an earlier age than most and the condition progresses more rapidly than in people without diabetes. Cataracts are often associated with diabetes because high blood glucose levels can cause changes to the lens of the eye. In humans surgery is required to replace the lens. No medications are currently needed but we will monitor the other eye closely. By regulating her blood sugar we can decrease the chance of cataract formation in the other eye. At this point we had been maintaining Peanut's glucose at around 100 mg/dL so the veterinary staff was not that concerned about the other eye developing a cataract.

After Peanut's exam she was brought back to a holding cage next to her old exhibit and cage mates. She was put on antibiotics in case of an underlying infection. She was lethargic for 2 days but by December 30, she started acting normal again and was released back into the main enclosure. It was never determined what caused her maladies, as her blood work came back normal.

Discussion

Diabetes in captive primates

In 2013, a research article was published called "A survey of diabetic prevalence in zoo housed primates" by Kuhar C.W., Fuller G.A., and Dennis P.M. (2013) at Cleveland Metroparks Zoo. They surveyed 160 AZA zoos in which 115 responded. They found 30% of the AZA zoos that responded had at least one diabetic primate at their facility. 80% of the primates that had diabetes were female. Over half were old world monkeys, followed by new world primates, prosimians and then the apes. Diabetes was found across the spectrum of new world primates but most commonly reported in callitrichids.

Fifty percent of zoos reported there was no significant change in the animal's behavior or temperament. Forty-four percent of zoos said animal was more alert and 47% described the animal as more active following treatment. While I do not have an activity budget to compare Peanut before and after treatment began, anecdotally, her attitude toward the keepers has changed dramatically and it appears she may be more active. She went from a shy animal to one that eagerly comes down to her keepers, even when not prompted. Many factors can contribute to this. We doubled the size of her enclosure. The added flight distance could have had a positive effect on her making her more confident and calm. When we changed Peanut's diet to low sugar it made our reinforcements we used in training that much more valuable. The low sugar gel was not as palatable to Peanut and when she realized what we were offering during training her willingness to participate increased dramatically. Another possibility could be she feels better now that her glucose levels are better regulated.

Eighty percent of the institutions in the survey made changes to the diabetic animals' diet. Most gels, biscuits, and canned diets are high in carbohydrates, the simple sugars diabetics are urged to avoid. In addition to diet change, many institutions in the survey implemented oral meds and insulin injections. They found that although there have been reports in literature on the use of oral medications and injections these techniques were not widely implemented. It is not clear to the authors if it was lack of information

or if was too challenging to implement. I am here to validate, that even though I was the biggest skeptic, I had success with both oral medication and injection training in a timely manner with our GLT.

Conclusion

Peanut met many of the criteria that the diabetic survey found prevalent in captive primates with diabetes. She is female, and a new world primate, the second highest group in the survey that had developed diabetes. Specifically, she is a callitrichid that has been overweight most of her life and relatively inactive. In hindsight I should have seen her disease coming. I could have made many of the changes much earlier in her life and possibly preventing the disease all together. Prevention of obesity can greatly decrease the likelihood of diabetes. Peanut weighed almost double that of a wild GLT. Sometimes it takes something tragic or an illness to spring us into action. I would not have had the motivation to injection train any of our callitrichids if it was not for the evolution of Peanut's disease. I have learned from my mistakes and maybe you can learn from mine.

There were many factors that could have prompted the success of the injection training. A larger enclosure, new cage mates, and a new diet. The oral medication glipizide has kept Peanut's glucose levels around 100mg/dL. Ideally we would like her to have no glucose in the urine, but her current level is acceptable. In the future we may opt to add a second oral medication.

Today, we can see and connect with the world through behavior. As I stated before, I was aware that other zoos had success with injection training their callitrichids. Through resources such as social media and list serves, we can now communicate with keepers with similar situations all over the world in real time. We can also share our success and failures at conferences such as the ABMA. Please learn from my mistake, give our animals more credit, know your excuses, and don't be a labeler.

References:

Kleiman D.G. and Rylands A.B.2002. Lion Tamarins Biology and Conservation. pp. 158

Kuhar C.W. Fuller G.A. and Dennis P.M.2013 A survey of Diabetic Prevalence in Zoo-housed Primates. Zoo Biology 32: 63-69

Good Motivation and Welfare Can Result In Good Animal Conservation: How Psychophysics Research to Determine the Effect of Anthropogenic Noise on Marine Animals

Kirstin Anderson Hansen¹, Magnus Wahlberg¹, Ursula Siebert²

¹University of Southern Denmark, ²University of Veterinary Medicine Hannover

At the University of Southern Denmark's Marine Biology Research Center, two male grey seals and two cormorants are trained for various research projects. They are currently participating in a bioacoustic study to determine the effects of anthropogenic noise from windmill parks and shipping noise on their daily life of searching for food, communicating with other conspecifics and raising their young.

Training animals for cognitive research projects can entail the animals having to do numerous repetitions of the same task over a long period of time, so how do we maintain the animal's motivation to continue to do the task while not affecting the research data? We would like to share with you what factors we considered in order to maintain good motivation as well as good animal welfare.



Posters

An Education Focusing on Animal Behaviour

Malene Friis Hansen and Pernille Bjerre

Roskilde Technical College

Roskilde Technical College (RTS), Denmark holds an outstanding education in animal care, respected and accepted worldwide. The education, Animal Keeper Specializing in Zoological Facilities focuses on increasing captive animal welfare through behavioural observations, enrichment, and training. Students are encouraged to dig deeper into the subject of animal keeping, teachers are well-educated, and specialists from the field are often giving talks. Visiting zoological facilities around the world are a main focus to ensure students are up to date and on the frontline of animal care.

Many subjects are taught to provide a holistic approach to animal care. Animal Behavior is a key subject in this approach. Focus here lies on becoming knowledgeable on basic, innate and learned behaviours for all vertebrate groups, as well as learning how to observe behavior. The subject Enrichment also contains a theoretical as well as a practical approach. Focus here is on creating, implementing and evaluating species-specific enrichment. Training provides students with invaluable skills in behavioural management. Everything taught at RTs must be directly transferable to the work of the students at their apprenticeships, and later on in their employment.

RTS has been educating animal keepers for several years, and now has animal keepers at zoos and aquaria all over the world. RTS holds other educations and also teaches individual courses, such as ZIMS. RTS is actually the first institution in the world outside of ISIS to provide an ISIS approved ZIMS certificate course.

Roskilde Technical College is one of only two schools in Denmark where you can study to become an Animal Keeper. Roskilde is situated just outside Copenhagen, the capital of Denmark. At Roskilde Technical College we educate Animal Keepers, Greenkeepers, Gardeners, and also Nature and Forestry technicians. All of these educations are part of the Vocational Education and Training system, where the theoretical part of the education is taught at school and the practical part is taught at an enterprise. The enterprises can be in Denmark or anywhere else in the world.

The education for Animal Keeper contains both short school periods of up to 10 weeks per period and longer apprenticeship periods of up to one year. The entire education takes from 3-3.5 years. Instructors include biologists, veterinarians, animal keepers, and school teachers who constantly improve their skills and knowledge by attending conferences and courses around the world. The team for the Animal Keepers includes 20 instructors.

Students can specialise in zoological exhibits, as horse managers, or in laboratories. They can also choose to specialise in pet shops or production farming and then become an Animal Keeper Assistant. This education only takes 2 years and contains the same alternation between school and apprenticeship.

At school students are taught all subjects in animal management and husbandry, such as feeding, health and safety



at work, handling medicine, conservation etc. We have a small farm with several different animal species – from marmosets to Herefords - ensuring that students learn immediately how to use learned theory in practice.

A large part of the subjects focus on behavioural management and these are the ones we have chosen to highlight here.

Training

Students are given a course in training animal which follows the guidelines of animal training in DAZA (Danish Association of Zoos and Aquaria). The learning mechanism, operant conditioning discovered by B.F. Skinner is used and the techniques specialised by Ken Ramirez amongst others are employed. This means that animals are trained using positive reinforcement to enhance wanted behaviours. Students learn the techniques through theory taught in the classroom and through practical sessions on the farm with an animal of their own choice. They learn to use a target, bridge, and a primary reinforcer. The alternation between theory and practice gives students a solid base for learning. They can take these skills and employ them at work when they are finished with their education. All over the world we see an increase in using training for behavioural management. We use it for medical procedures, for moving animals securely and for simply working with the animals safely and securely on a day to day basis. Furthermore we have seen an increase in educational shows here in Denmark. We wish to prepare our students and have them in the frontline of training animals for this whilst remaining focused on the educational purpose.

Enrichment

The subject enrichment is very practical. The students formulate several enrichment items and build them themselves and implement them on the farm. We teach using Disney's S.P.I.D.E.R. Framework. This method helps the students reflect over all their choices and thereby creating enrichment that is truly enriching. We support the students through their process and remind them to think species-specifically and have a great focus on safety, both for themselves and the animals. They employ behavioural observation techniques to assess the effectiveness of the enrichments. We use the five categories from Shape of Enrichment to help the students identify all the different senses and ways in which you can enrich and all the different items you can use. Besides creating and implementing enrichment items during the course they also learn to create weekly enrichment plans. When possible we also include a small course on creating knots like monkeyfists and such.



Behaviour and welfare

The focus in the subjects of behaviour and welfare is to teach the students objective methods enabling them to make correct assessments and observations. Behavioural sampling methods are derived from Jeanne Altmann's studies (1973) and include focal-animal sampling, scan sampling and ad libitum sampling. Students work in the classroom creating ethograms and preparing for observations. Observations are then carried out on the farm and thereby methods and techniques are fully comprehended. Focus in Animal behavior is to teach students to study animals without affecting their behavior and analysing data without incorporating own feelings. Basic descriptive statistics are used to analyse data and create results and conclusions. In Animal Welfare we employ the welfare circle technique. The technique was actually invented in production farming, yet it has proven valuable for other animal fields as well. This technique again focuses on the combination of theoretic know-



ledge and practical assessments. An animal is chosen and questions are given in eight categories within different parts of the husbandry of the animal. With this technique as with the behavioural sampling methods we end up with results that are visually powerful and thereby easier to conclude and act on. Students are always asked to compare results with the natural needs of the animal and to provide advice for future management of the animals derived from comparison with the natural behavior and the end results from their assignments. To ensure students are capable of making these assignments they are also given lectures in the classroom on animal behavior and welfare. They are taught about innate and learned behaviours, social structure, parental care, foraging-, aggressive-, agonistic- and affiliation behaviours and so forth. Abnormal behaviour, stress and stereotypical behaviour is also introduced. In welfare they learn about the five freedoms, the 3Rs, and other welfare theories and assessment methods. They are also taught our national and regional legislation.



ZIMS:

Last year we started giving courses in ZIMS. We are officially the only organisation outside of ISIS who provides ISIS approved ZIMS certificate courses. Focus here has till now primarily been on the daily use of ZIMS for animal keepers. They are taught how to add animals, enclosures, life support and components, and all the information for each, which includes all measurements and observations. They also learn how to search for data in ZIMS and create records of entire populations or single animal pedigrees for example. We use LearnZIMS which is a ZIMS playground used by educational institutions. It has all the same functions as ZIMS, yet data is not the same. LearnZIMS only contains fake data and students are free to add all the data they need to learn to use the database correctly.

So far three courses have been held and 35 people have achieved a certificate in ZIMS. A maximum of approximately 10 people per course is preferred to ensure a proper learning environment with adequate support from the teacher. With almost 850 zoological institutions using ZIMS worldwide a ZIMS certificate has proven to be very useful.

For further information on courses and more, please contact Malene Friis Hansen maf@rts.dk

[illegible]

Scan sampling		Kommentarer				
Art						
Obs.interval	Interval observationer	Kontinuerlig observationer				
		Adfærd		Tid/antal		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
Adfærd						
Total						

Behavioral Study in Weedy Seadragons (*Phyllopteryx taeniolatus*)

Susan Schodt Lyngé and Cecile Gronlund Clausen

National Aquarium Denmark

A behavioral biologist, Cecile Gronlund Clausen, and I, an aquarist at National Aquarium Denmark, have over a 3 month period worked on basic behavioural study on weedy seadragons. The study looks at behaviours such as hunting, displacement, movement, and other more species specific behaviors. We have also looked at the respiratory rate over the full period, to get an idea of when a seadragon is calm, stressed, and how long it takes for it to settle down after changes have occurred to its environment. We have also looked at the weedy seadragons placement within their tank, and if their placement can be influenced by changing the placement of the plants; this should improve the visitor's experience without compromising the sea-dragons well-being. Finally the last 2 weeks of the study we introduced seven juveniles to a tank of three adults

On top of that I, Susan, have carried out a 2 week similar study at Aquarium of the Pacific, USA (November 2014) and at California Academy of Sciences, USA (December 2014).

This appears to be the first real behavioural study on weedy seadragons in captivity, so it should provide a foundation for further studies within this weedy seadragon field.

In this paper we present an exploratory study on captive weedy seadragon (*Phyllopteryx taeniolatus*) behavior to better understand their time budget. We discovered a general lack of published knowledge concerning weedy seadragons in captivity and their behavior. The majority of the observations were carried out at National Aquarium Denmark, however limited time was also spent observing individuals at Aquarium of the Pacific, Long Beach, U.S., and California Academy of Sciences – Steinhart Aquarium, San Francisco, U.S., to see if there appeared to be similar trends. Habitat alterations occurred to discover if this would have an influence on the weedy seadragons placements with their exhibit. Mirroring, or tail-curling as it will be referred to in this study, was also observed and finally ventilation rates (the number of bucco-opercular movements per minute), were measured to get a better idea of the possible correlation between respiration and stress in weedy seadragons.

Introduction

The weedy seadragon (*Phyllopteryx taeniolatus*) is a marine species endemic to southern Australia and Tasmania, and its coastal habitat of rocky macroalgal reefs, dense vegetation and sand covered areas. They are presumably found down to a depth of approximately 19 meters. The weedy seadragon and its only other fellow species members, the leafy seadragon (*Phycodurus eques*) and red-ruby seadragon (*Phyllopteryx dewysea*), whose existence was unknown until published by Stiller J, Wilson N.G and Rouse G.W. on the 18th of February 2015, all fall under the order Syngnathiformes and family Syngnathidae, like seahorses, pipehorses and pipefish. At the limited number of facilities around the world, where the weedy and leafy seadragons are displayed, they have an ability to capture aquarium spectators and can therefore be suggested to be identifiable symbols or flagship animals for Australian marine species conservation.

Dulvy et al. (2003), have found that up to 37% of all reported marine population extinctions have a direct coalition with habitat loss. As weedy seadragons mainly populate coastal areas with high anthropogenic activities, potential habitat loss has been identified as one of the biggest threats to seadragons and their fellow family members, Kuitert (2001). The weedy seadragon has been assessed to belong in the Near Threatened category of the IUCN Red List (2006), however further studies will need to be conducted, to get a clearer understanding of the current population and threat status.

In a study on 729 wild seadragons, Camara-Sanchez et al. (2006) found that weedy seadragons tend to stay in the same areas throughout the year, with a strong preference of weeded rock and/or sand habitat. Areas with a higher density of kelp, grass and to some extent mysid crustaceans (although the mysid crustaceans populations were higher in border areas, than in kelp beds), had a higher seadragon density, than the more exposed habitats. In the same study, they also found that weedy seadragons are mainly solitary animals, where 59% of the individuals were found living solitary. Occurrences of pairs (23%), of groups of three (12%) and groups of between 4-7 individuals (6%) were far less common at the study sites. Thus perhaps they mostly meet during courtship or when carrying eggs. Evidence as such is worth taking into consideration, in public aquariums, where this species is often kept together with three or more conspecifics. Sanchez-Camara and Booth (2005) suggest that small home ranges and at times low population densities could favor monogamous behavior, which would also explain the low degree of sexual dimorphism found in the species. However, as argued in their later study published in 2006, they did not find evidence supporting this, as the distribution of sexes in the pairs they observed was random.

Some aquarium exhibit tanks have areas where their weedy seadragons can be out of sight to public spectators. Choosing to stay in these areas may be interpreted as avoidance of human presence, and could presumably reduce stress. However, such a situation is challenging for the institution, who wishes to display the animals to the public.

The initial aim of this study was to investigate if it was possible to rearrange the plants in the exhibit tank, to enable the seadragons to utilize the entire tank, keeping them safe and calm while visible to the spectators. In preparation for this study we discovered a general lack of knowledge concerning weedy seadragons in captivity and general seadragon behavior and decided to conduct an exploratory study to better understand their time budget in captivity. This is of importance, as we see a range of behavioral displays in captivity, and according to Sanchez-Camara and Booth (2006) there also seems to be social interaction between weedy seadragons in the wild. Observations therefore included behaviors such as swimming, resting, foraging and social interactions such as “tail curling”. A detailed ethogram describing these behaviors can be found in appendix i.

Inspired by Melbourne Aquarium’s Husbandry Manual (2012), and a study in respiratory (opercula) rates in their seadragons, we also decided to register ventilation rates, which we hope can be used as a diagnostic tool for stress and disease.

Method

Three captive populations of weedy seadragons were observed for this study, and these include the populations residing at the National Aquarium Denmark (three sub adults), Aquarium of the Pacific (23 adults and sub-adults) and California Academy of Sciences – Steinhart Aquarium (five adults).

National Aquarium Denmark

The captive population consisted of three sub-adult individuals (P1, P2 and P3). After a number of pilot observations, an interval of 3 minutes for 1 ½ hours, 3 times a day (8am-9:30am, 11:30am-1:00pm and 3pm-4:30pm), was decided upon as a suitable time-frame for the observations. Thus, the individuals’ behavioral state was registered every 3 minutes. Events such as social interactions and foraging were registered using one-zero sampling. All observations for the study took place between the 22nd of August 2014 and until the 13th of November 2014. However, the observations that happened prior to the plant alterations took place from the 14th of October 2014 until the 19th of October 2014.

Plant alterations

The plant alterations took place from the 20th of October 2014 until the 11th of November 2014. During this period, four kelp plants and six grass plants were used to practically alter the exhibit within a 2 week period. This was done four times during the project (the plants were placed left, right, center within the exhibit, which was also left barren without any plants, while closely monitoring the seadragon's stress levels).

A drawing of the three different exhibits were made, figure 1, showing National Aquarium Denmark's weedy seadragon tank split into equal sized, visual sections (horizontally: A & B: 1, 2, 3, 4, 5, 6 and vertical-ly: X, Y, Z), to determine where the individuals were positioned within the exhibit.

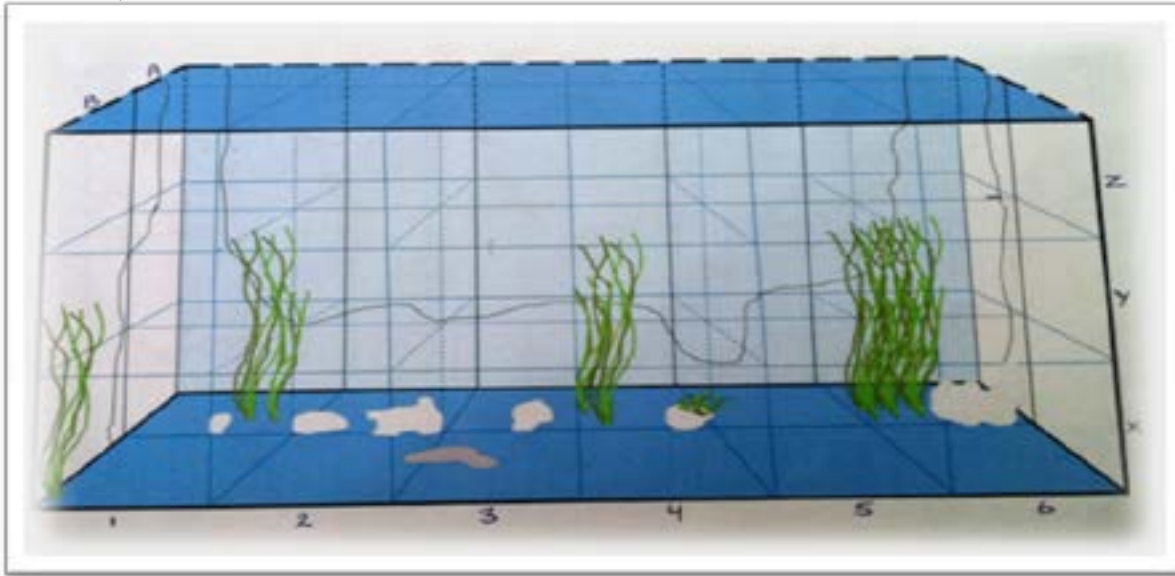


Figure 1. The image illustrates one of the drawings created, this one by Cecilie Grønlund Clausen of the exhibit at National Aquarium Denmark, to visually be able to determine, where the weedy seadragons spent their time within the exhibit [Image rights: Clausen, C.G. (2015)].

The data was split into 'before', 'during' and 'after'. These headings refer to 'before' the plant alterations took place and no abnormal external interferences had occurred. Here the exhibit contained four small patches of grass, but no kelp. 'During' the plant alterations, where one visual square contained kelp, another contained a patch of grass, and the other areas were left barren, while plants were moved either to the left, right, center of the exhibit or removed completely. 'After' the plant alterations, is referring to when the plant density was increased within the exhibit (35 bundles of grass and seven kelp plants). Kelp was placed in both acrylic window corners of the exhibit near the tank-wall. Grass was placed along the exhibit's back-wall. Additionally during this period, two, and thereafter five juvenile weedy seadragons were added to the exhibit, with a 5 day gap in between the introductions.

Juvenile introduction

On the 2nd of November 2014, the plant density within the exhibit was increased and on the 3rd of November 2014, two juvenile weedy seadragons, who had previously been kept backstage for a period of 10 months, were introduced to the exhibit tank. On the 8th of November 2014 the remaining five juvenile weedy seadragons, who had also been kept backstage, were introduced to the tank. The reason for splitting the juvenile group of seven into two groups during the introduction stage was due to precautions. There were some uncertainties as to the juveniles' behavior, stress levels and eventually survival rate, when released into the main exhibit; they had not previously been exposed to spectators and other disturbing factors.

Aquarium of the Pacific & California Academy of Sciences – Steinhart Aquarium

Observations were carried out at Aquarium of the Pacific, during the 20th of November 2014 until the 28th of November 2014. Observations carried out at California Academy of Sciences – Steinhart Aquarium, happened between the 2nd of December 2014 and until the 10th of December 2014.

At both institutions in the US, for the scan-sampling observations, an interval of 3 minutes for 1 hour, twice a day (approx. 8-9am or 10-11am and 12-13pm or 14-15pm; representing morning and afternoon) was decided upon. Again, the data was split into ‘before’ and ‘during the plant alterations, referring to the time period prior to any external changes within the exhibit, and the period where plant positions within the exhibit were altered. At both institutions the plants already present within the exhibit were used to alter the captive habitat. Observations were carried out before the plant alterations (for 4 days), alongside talks with the assigned aquarists, to get an idea of whether or not the identified areas were in fact where these individuals would usually spend the majority of their time. This was followed by the plants being moved to the left side (where possible) of the exhibit for 4 days, and eventually the majority of the plants (where possible) were moved to the right side of the exhibit for 4 days.

Curling

During the study, we also monitored ‘tail-curling’ behavior and attempted to register its occurrence in captive individuals. ‘tail-curling’ is a word Cecilie Grønlund Clausen and I have re-defined to describe the act carried out when two individuals position themselves next to one another with their tails curled away from the other individual, figure 2.



Figure 2. The image illustrates the behavioural act amongst weedy seadragons, described as ‘mirroring’, ‘the mirroring dance’ or in this paper ‘curling’. [Image rights: VOA [n.k.]].

National Aquarium Denmark

At National Aquarium Denmark, tail-curling, alongside other species specific behaviors, were registered using one-zero sampling, 3 times a day for 1 ½ hour at a time, alongside the scan-sampling observations, registering all the individuals whereabouts every 3 minutes.

Aquarium of the Pacific and California Academy of Sciences – Steinhart Aquarium.

At Aquarium of the Pacific, the one-zero sampling method was altered upon arrival, because the exhibit contained 23 adult and sub-adult individuals. Because of time restraint, it was not possible to tell all the individuals apart and register their individual placement every 3 minutes. Thus, scan-sampling of the in-

dividuals as a group was used, and gave an idea of where the majority of the group, spent their time within the exhibit. Thus this approach was carried out singularly (not alongside the other scan-sampling observation) twice a day, for 1 hour, registering the groups placements every 3 minutes.

California Academy of Sciences- Steinhart Aquarium

At California Academy of Sciences – Steinhart Aquarium, the National Aquarium Denmark approach of registering the scan sampling data alongside the one-zero sampling data was used. This approach was chosen because the exhibit contained five easily distinguishable adult individuals. Thus, the one-zero sampling followed the scan-sampling approach, 4 times a day of 1 hour intervals, registering all the individuals whereabouts every 3 minutes.

Ventilation rate

Data was collected on three sub-adult weedy seadragons (P1, P2 and P3) at the National Aquarium Denmark. Data includes a total of 392 registrations of ventilation rate, in the period 24th September-13th November 2014.

The ventilation rate (VR: the number of bucco-opercular movements pr. minute) was regularly registered for a minimum of one minute at a time, and the number of movements were noted at 15, 30, 45 and 60 seconds. Information such as individual activity level and foraging behavior was also registered to account for their influence on the ventilation rate. Susan Schødt Lyngé counted the ventilations, announcing them loudly, by constantly looking at the gill movements and Cecilie Grønlund Clausen registered the numbers announced in a grid while looking at a stop-watch.

In situations where stress inflicted on the individuals was inevitable due to cleaning and routine anti-protozoan medical treatments (a 3 hour bath in Metronidazol (Baxter Viaflo 5 mg/ml)), we registered ventilation rate for between 60-70 minutes at a time, which we found to be enough time for each individual to return to a normal ventilation rate. By plotting these registrations on a graph, we hope to 1. get a clearer understanding of stressful ventilation rates and 2. discover a time frame within which it takes the seadragons to return to 'normal'.

Please be aware that the variation of counts per individual were caused by their position and therefore visibility in the tank; sometimes they were out of sight and we were therefore unable to monitor them.

Water qualities

At National Aquarium Denmark, water analysis were carried out three times a week (Monday, Wednesday, Friday) on the system water known as P16 by Susan Schødt Lyngé. This was done by using a JBL analysis test set and accompanying parts. Latex gloves were worn to avoid contamination of the samples. Test glasses were rinsed with demineralised water, and then 5 or 10ml, depending on what the specific test required, was put into the glasses with a syringe. The JBL manual was punctually followed, and the specific test liquids were added. Then the test were set to rest for the required time (3 - 20min, depending on what the water was being tested for), and then it was read against the JBL color diagram. The water analysis focused on measuring NO₂ (Nitrite), NO₃ (Nitrate), NH₄ (Ammonium), PO₄ (Potassium), KH (water hardness), pH, Salinity and temperature. This is because some are toxic to most taxa, and the stability of others are, according to Koldewey, H. (2005), considered to be vital (pH, salinity and temperature) for maintaining healthy weedy seadragons. Water analysis data was received from Aquarium of the Pacific and California Academy of Sciences – Steinhart Aquarium, on Susan Schødt Lynges return to Denmark in December 2014.

Results

The following section looks at the data results of habitat exploitation at all three institutions (National Aquarium Denmark, Aquarium of the Pacific and California Academy of Sciences – Steinhart Aquari-

um). In section 4.2, the data presents the effects, the habitat alterations had on the aquarium spectators' visual view of the weedy seadragons at National Aquarium Denmark. Data on the similar and different kinds of tail-curling observed at the three institutions, is presented in section 4.3. The only data which has currently been exposed to statistical analysis is the ventricle rate data from National Aquarium Denmark, which is illustrated in section 4.4. Finally water analysis data from all 3 institutions is presented in section 4.5.

Habitat exploitation

In regards to this study, the three institutions where weedy seadragons were observed all had different sized and shaped tanks displaying their weedy seadragons. National Aquarium Denmark have a tall, horizontally long, rectangular shaped tank, figure 3. Aquarium of the Pacific have a tall, horizontally oval shaped tank, figure 4. Finally, California Academy of Sciences – Steinhart Aquarium, have a tall, cylinder shaped tank, figure 5, where they have added a background, as their weedy seadragons felt too exposed within this tank setting prior to the change.



Figure 3. The image illustrates the weedy seadragon exhibit at National Aquarium Denmark.



Figure 4. The image illustrates the weedy seadragon exhibit at Aquarium of the Pacific.



Figure 5. The image illustrates the weedy seadragon exhibit at California Academy of Sciences – Steinhart Aquarium.

Visitor experience

At National Aquarium Denmark, part of the reasoning for conducting this trial was to improve the spectators' ability to see the weedy seadragons on exhibit. Thus, after the observations, we were able to compare roughly how much time the individuals spent out of sight and visible to the guests depending on their placement within the tank.

As mentioned previously in the methods section, 'before' is referring to the period prior to abnormal plant alterations within the weedy seadragons captive environment. 'During' is referring to the period where plants were moved (left, right and centered within the exhibit) every 3 days. Finally, 'after' is referring to the period where the plant density within the exhibit was increased, and also where first two and then five juvenile seadragons were added to the exhibit.

Adult P1

The adult individual P1 was visible 9% of the time before the plant alterations took place, thus out of sight 91% of the time. During the plant alterations the individual was visible to the aquarium spectators 86% of the time and after the plant density was increased within the exhibit, it was visible to the spectators

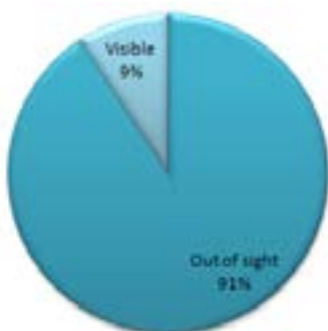


Figure 9a. The chart illustrates where adult P1, National Aquarium Denmark, spent the majority of its time before the plant alterations.

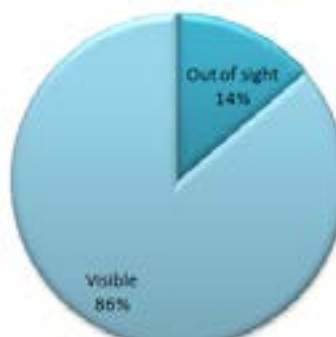


Figure 9b. The chart illustrates where adult P1, National Aquarium Denmark, spent the majority of its time during the plant alterations.

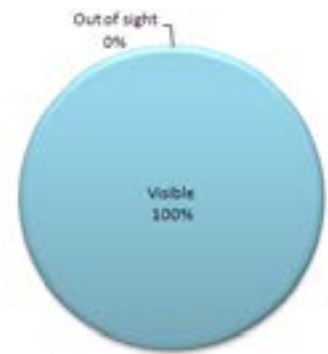


Figure 9c. The chart illustrates where adult P1, National Aquarium Denmark, spent the majority of its time after the plant alterations.

100% of the time. Fig. 9a-c.

Adult P2

The adult individual P2 was visible 75% of the time before the plant alterations, thus out of sight 25% of the time. During the plant alterations the individual was visible to the aquarium spectators 92% of the time and after the plant density was increased within the exhibit, it was visible to the spectators 100% of the time, Fig. 10a-c.

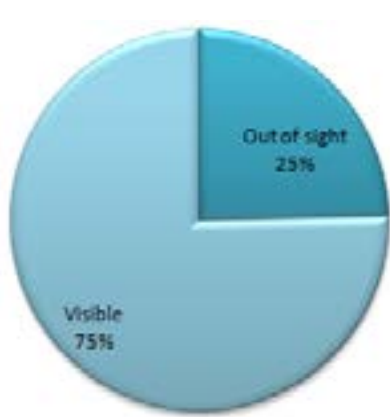


Figure 10a. The chart illustrates where adult P2, National Aquarium Denmark, spent the majority of its time before the plant alterations.

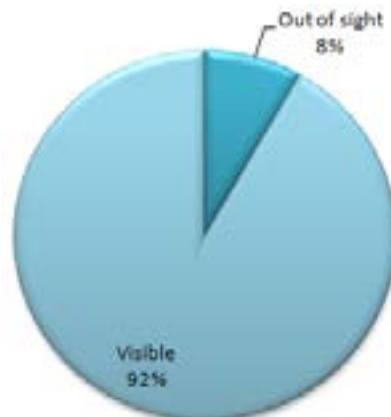


Figure 10b. The chart illustrates where adult P2, National Aquarium Denmark, spent the majority of its time during the plant alterations.

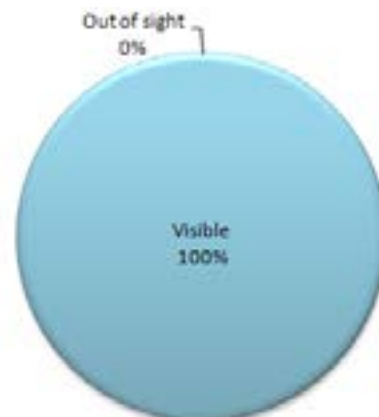


Figure 10c. The chart illustrates where adult P2, National Aquarium Denmark, spent the majority of its time after the plant alterations.

Adult P3

The adult individual P3 was visible 6% of the time before the plant alterations, thus out of sight 94% of the time. During the plant alterations the individual was visible to the aquarium spectators 34% of the time and after the plant density was increased within the exhibit, it was somewhat visible to the spectators 100% of the time (however standing between the dense vegetation and could still be difficult to see, but the individual was not completely out of sight anymore).

Curling

During the study, questions arose as to whether or not this curling behavior can purely be said to be breeding behavior. Thus, this was discussed with Pang Quong, who has a long history of working with weedy seadragons under wild and captive conditions:

“Behavior described as courtship fits nicely into the commentary of documentaries but may be for others reasons. [...] the curling described can happen in groups, female-female, male-male as well as opposite sex, plus sometimes ones fully laden with eggs. [...] There is no doubt that some mirroring happens prior to eggs exchange-but for some individuals it may also purely be territorial.” (Quong, P. (2014) e-mail correspondence).

At National Aquarium Denmark the data showed that the frequency of tail-curling did not change when the plants positions were altered or when juveniles were introduced to the exhibit (KW= 0,0414-5,571, df=3, P=0,0617-0,9795).

However, during the observations it became apparent that the weedy seadragons curled their tail in different directions. We do not have any suggestions as to what the different tail-curves mean; however, it is an area that would be interesting to explore more when looking at weedy seadragon behavior. Also,

perhaps some of these expressions/behaviors co-exist with the behaviors in the wild, while others may have formed in a captive setting or may only be used by a single individual. See appendix ii for photographic evidence of the different behaviors and tail-curlings observed and expressed by individuals at National Aquarium Denmark, Aquarium of the Pacific and California Academy of Sciences – Steinhart Aquarium.

Ventilation Rate

We tested the ventilation rate (VR) statistically to find if it made a difference if you registered it for 15, 30, 45 or 60 seconds. We found no statistically significant difference between these measurements when they were multiplied to resemble counts per minute ($KW=0,43$, $df=3$, $P=0,81$), giving us more measurements for further analysis.

Further analysis showed that VR is individual, as we found a significant difference between the three individuals, both when in an active ($KW=7,69$, $df=2$, $P=0,02$) and inactive state ($KW=33,67$, $df=2$, $P<0,0001$). Furthermore, we also found that VR was higher when the individuals were active, than when they were inactive ($t(70)=4,218$, $df=1$, $P<0,0001$ and $U=13-238$, $df=1$, $P<0,01$) Fig. 12.

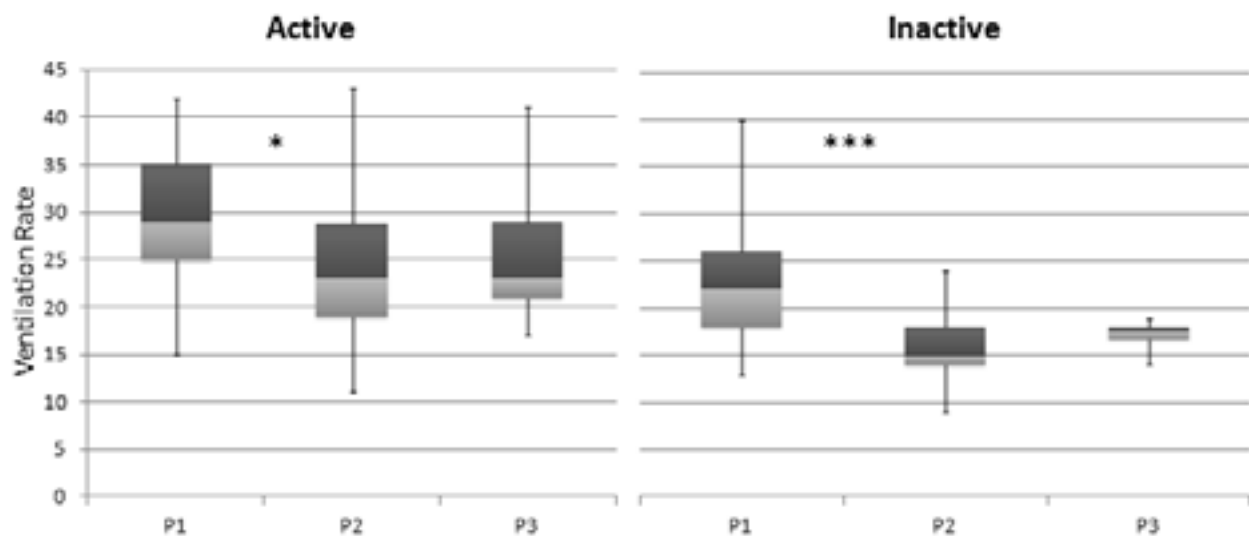


Figure 12

Stress Curve

To investigate how long it takes for a weedy seadragon that has been exposed to a potential stressor or to return to a normal VR, we made continuous registrations immediately following a known stressor (medical treatment) for about 60-70 minutes. The following results only include data taken from the population residing in the National Aquarium Denmark.

The average VR we measured throughout the entire study was 19 for inactive and 26 for active individuals, with a total average of 22 bucco-opercular movements per minute. We

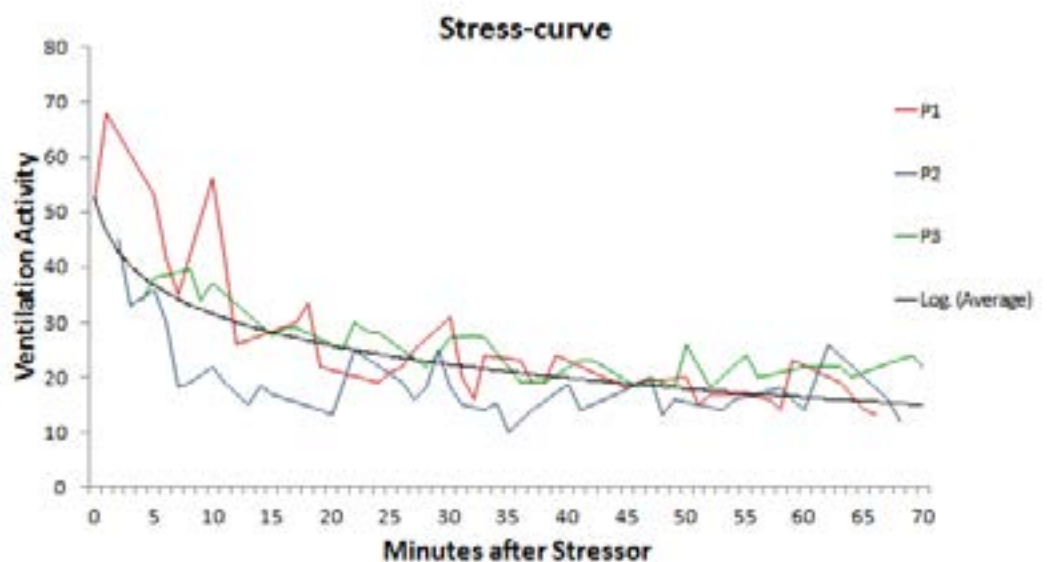


Figure 14

have drawn a Stress-curve (Fig. 14) which is based on a total of 148 registrations of VR. These registrations were taken for each of the three individuals on three different occasions. The curve shows a steep decline immediately after stress was inflicted upon the individuals and seems to level out towards the general average VR after 20-30 minutes.

Habitat exploitation

National Aquarium Denmark

Overall, the individuals at National Aquarium Denmark (P1, P2 and P3) all seemed to be affected by the plan alterations in their captive habitat. Also, with an increase in plant density in the exhibit, they all seemed to be more visible from the spectator area out of their own free will. They now tend to hide amongst the plants, where we assume they must feel safe and in control of the situation while they are still completely visible to the spectators.

Aquarium of the Pacific

At Aquarium of the Pacific, the weedy seadragons generally did not appear to change their places of preference within the exhibit when the plants were moved around, except for a few of the 23 individuals. The others were very focused on creating the group bundling formation, which didn't appear to change, while their surroundings did. However, there is not sufficient data to conclude any further.

California Academy of Sciences – Steinhart Aquarium

At California Academy of Sciences – Steinhart Aquarium, they somewhat appeared to change their place of preference, depending on where the plants were situated within the exhibit. Prior to the study, 4 out of 5 individuals, had a tendency to spend the majority of their time at the back of the cylinder tank (this was confirmed by the aquarists), and this seemed to change at times when the plants' changed position. However, there is not sufficient data to make any conclusions.

Also, other factors may have influenced the seadragons' placement preferences. For example at National Aquarium Denmark, the seadragons had just been moved from a smaller exhibit (5400 litres) into their current exhibit (9100 liters) and was only given 1 week to adjust to their new surroundings before the study started. Therefore, they may not have completely explored the tank well enough to have made a choice. Also, the water-flow and tank shape can influence where some individuals may prefer to spend their time. At National Aquarium Denmark, there are two Maxspect Mazzara-p LED lights above the tank whose light may cut the water in such a way that one area of the tank may be more comfortable than another area.

Visitor visibility

This study also had a focus on improving the spectators' view of the seadragons at National Aquarium Denmark. When the individuals were registered as spending time at either side of the tank edges (left or right), they were either difficult for spectators to see or not visible at all. Before the plant alterations took place, P1 was only visible to the spectators 9% of the time (out of sight or difficult to see 91% of the time). P2 was quite visible to begin with (75% of the time), and difficult to see 25% of the time, while, P3 was rarely visible (6% of the time) and spent 94% of the time completely out of view. During the plant alterations there was a visible shift in preference, where P1, P2 and P3 spent 86%, 34% and 92% of their time in a visible area. Noticeably, when more plants were added to the exhibit, all three individuals were more visible, away from the tank edges 100% of the time. However, we should mention that P3 preferred to spend its time near the back-wall, surrounded by grass in the 'after' plant alterations part of the study. It was still difficult to spot P3, however not impossible as before. It should be mentioned that when the plant density was increased in the exhibit, kelp plants were placed at either side of the tank in an attempt to provide a place for them to hide. In doing so, these plants also occupied most of the areas in which the seadragons could previously hide, out of sight to the spectators. Therefore, there is a small uncertainty,

whether the addition of plants encouraged or forced the seadragons away from their hiding spots. Overall, the weedy seadragons at National Aquarium Denmark became more visible to the aquarium visitors and did not seem to take harm.

Tail-curling

We did not get any closer to revealing the purpose of this special interaction. We were hoping to find tendencies pointing in a direction of it being either a territorial or reproductive communication, but since our data shows that there is no difference in the frequency of its occurrence from before anything was altered, while plant positions were altered, and after novel juveniles were introduced, we cannot conclude any further on this matter. We do, however, believe that it is extremely interesting and vital to understand what they are using this signal for. If it is of a reproductive nature, it would be interesting for the aquarist, who wishes to breed the species in captivity to know if it signals gender, sexual maturity or reproductive status. On the other hand, if it signals territorial tendencies, it might be worth considering the individuals need for space, away from its conspecifics, as well as considering tank and population size in captive environments.

Respiratory rate

Given our findings on the number of seconds you choose to count the bucco-opercular movements, we argue that it is now easier to get accurate measurements and surveil this species through time, despite a busy schedule.

We do not know why there is a difference in VR between individuals P1 and P2. One theory is that VR is influenced by size. P1 and P2 were the biggest and smallest of the three individuals, which may account for the difference in VT. Another theory is difference between sexes, as we suspect that P2 is a female. However, we have no evidence to back it up, and if sex was the causal factor, we would expect to see a difference between either one of them and P3 as well.

We avoided purposely stressing the animals, as they are very delicate creatures with a tendency to cope badly in stressful situations. Unfortunately, this means an inadequate amount of data and we encourage others to register VR whenever possible, while taking the same precautions as we have.

We still have more data that needs to be processed, including data on juvenile ventilation rates, and ventilation rates of individuals in other aquaria. We hope to achieve information that can be of use in aquaria housing weedy seadragons, and maybe even other species within the Syngnathidae family.

Water analysis

The equipment used to carry out the water tests at National Aquarium Denmark proved during the study to provide some unreliable results when comparing results with different water analysis equipment used by the LSS (Life Support System) team at the aquarium. Because of the P16 systems size (approx. 55.000 litres of water), the average levels remain quite stable. During a back-wash, the system loses 16 litres pr. second, and a backwash last 3 minutes (a total of approx. 2880 liters is lost). Additionally slightly more water than this is daily added to the system, due to water surface evaporation and the water that is continually used to clean the foam fracturators. However, also the contaminated water being removed from the foam fracturators. The filtration system cleans 12 liters of water per second (43.000 litres per hour), meaning that all of the P16 system water is filtered 18,9 times every 24 hours. The saltwater storage unit, P11, which is manually mixed saltwater, has a general pH of 8, and the P16 system unit that the weedy seadragons tank is attached to, has a general pH of 7.95. During a water top-up from P11, the pH will slightly increase, however during the day, mainly due to denitrification in the nitrate filtration system, the pH will gradually decrease making the water a little more acidic. This is a daily, and continuous occurrence when P11 system water is added to the P16 system.

Although weedy seadragons are considered to be very pH sensitive, it is also worth to consider that the water measurement equipment is never 100% accurate. So minor recorded changes, which one

should remember also occurs in the wild, should not be considered as a cause of concern, unless the drop or increase appears significant. Thus, there does not appear to have been any sudden or major changes in the water qualities, nor in the water temperature, salinity or pH during the study (according to National Aquarium Denmark's LSS team). However, because the water analysis data we carried out three times a week proved somewhat unreliable and because we have not studied the direct coalition between water qualities, tank placement and curling, we cannot conclude that these have not affected one another.

Sources of error

At National Aquarium Denmark, medical treatment of the three adults during the project was inevitable and could very well have influenced our data. First of all, the possible illness, the stressful situation and the treatment (Metronidazol (Baxter Viaflo 5 mg/ml) could have altered the individuals behavior and choices. Secondly, it inflicted upon our study plan, as we were on a tight schedule and treatments were not planned from the beginning. We therefore missed out on a planned observation on the 31st of October, meaning that on the 2nd of November, two individuals were observed at the same time and missed out on a day's observation in the setup of there being no plants in the tank.

Preferably we would have liked to observe the seadragons for 1 month in their new exhibit, before altering the plant positions, and for the same amount of time after the plant alterations, before the introduction of the juveniles. However, because of the scheduled introduction of the seven juvenile seadragons, this was not possible.

The number of spectators varies from day to day, and therefore influences such as hands touching the acrylic window and flash photography may also have influenced their behavior. As a Christmas special, red lights on all tanks were tested (in between the observations on the 11-11-2014). This proved to be an immense stress factor for the 1 minute it lasted (there was no slow increase in red light. It went from regular light to red immediately), as all 10 individuals (adults and juveniles) headed for the acrylic window and then to the surface of the tank. They started piping air, which can cause serious physiological harm and should be avoided. Luckily they all settled quite quickly and no permanent damages seemed to have been inflicted on any of the individuals.

Conclusion

What we can suggest, based upon the data from this study, is that it appears to be possible to influence where some weedy seadragons spend the majority of their time, based upon the placement of the plants. This appeared to be the case at National Aquarium Denmark, and somewhat at California Academy of Sciences – Steinhart Aquarium, although it did not appear to have any effect on most individuals at Aquarium of the Pacific. This could however be because of other reason, such as the group size, the familiarity with the tank etc.

However, at National Aquarium Denmark with animal welfare in mind, we created the framework to make the weedy seadragons become more visible to the spectators without compromising their feeling of safety. We attempted to create a captive environment more closely resembling their natural habitat. Now, we believe that they have a better opportunity of performing natural behaviors while feeling safe, able to use their camouflage abilities to hide in 'kelp forests' or hunt near a patch of kelp or grass, that they can retrieve to when feeling unsettled. The added amount of plants to the exhibit has created more maintenance work for the aquarists, however we would argue that cleaning these plants every 14 days is feasible when looking at the benefits gained by the animals.

We are not able to conclude on anything concerning the tail-curling behavior. We believe that we have not been able to collect enough data, and encourage others to conduct studies that focus directly on testing this communicative interaction.

We decided to register ventilation rate to investigate factors, which may influence it and therefore give a false indication of stress. So far, we have found that ventilation rate differs between individuals, but whether this is completely individual or is the cause of other factors such as sex or size has not been

discovered yet. We know, however, that when using ventilation rate to measure stress, one must consider whether the individual is active or not. We still have a feasible amount of data that needs to be analyzed, including juveniles' ventilation rate, which we expect to be different from adults, based on the data presented in the Melbourne Aquarium Seadragon Husbandry Manual (2012). We also still need to statistically analyze more of this data and look at our collected foraging, scratching, activity level etc. data

We highly encourage others to conduct similar, and more in depth weedy seadragon studies, so that we all can learn more about captive weedy seadragons.

Personal Contacts and Special Thanks to:

Delbeek, Charles, Assistant Curator, California Academy of Sciences – Steinhart Aquarium (December 2014).

Foder, Briana, Weedy Seadragon Aquarist, Aquarium of the Pacific (November 2014).

Friis, Thomas, Teamleader and Aquarist, National Aquarium Denmark

Gravelund, Peter, former Head of Research, National Aquarium Denmark (October–December 2014)

Hale, Paul, Curator, Melbourne Aquarium (October 2014).

Matsushige, Leslee, Co-curator, Birch Aquarium (May 2014).

Posch, Christian, Aquarist, National Aquarium Denmark.

Quong, Pang, PQ Aquatics (October 2014).

Skov, Mathias, Aquarist, National Aquarium Denmark.

Behaviour	Description
Resting	Standing still in the water. Movement restricted to the fins, which are expected to be in use, as well as changes in orientation around its own axis.
Swimming	Movement resulting in a change in positioning, either horizontally through the tank or vertically in the water column. A change in positioning is defined as an individual having moved a body's length (approx. 30-45 cm).
Feeding/Foraging	The act of lashing out after a prey animal, whether any are caught/eaten or not.
Hiding/Out of sight	When the study objects is not visible to the observer, making it impossible to properly determine behaviour.
Displacement	When the approach of one individual triggers a response in another to move/change physical positions in the tank.
Tail-curling	Interaction between individuals. Posture in which a seadragon curls its tail to the left or right – usually away from its conspecific.

Appendix ii

Behaviours and tail-curling observed at National Aquarium Denmark, Aquarium of the Pacific and California Academy of Sciences – Steinhart Aquarium. As the table show, most of the behaviours and tail-curly occurred at all three institutions.

National Aquarium Denmark	Aquarium of the Pacific	California Academy of Sciences – Steinhart Aquarium
	Tail-curling, with no curling response from other individuals.	
		
	Tail-curling with a response from another individual.	
		
	Tail-curling with 'push' mirroring.	
No photographic evidence from National Aquarium Denmark.		
	Same-side tail-curling – both individuals curl their tail to the same side.	

		
	Tail-curling upwards.	
Not observed at National Aquarium Denmark	Not observed at Aquarium of the Pacific.	
	Tail-curling downwards.	
Not observed at National Aquarium Denmark.		Not observed at California Academy of Sciences.
	Multiple-participant tail-curling, involving 3 or more individuals.	
		
	Push – individuals, 2 or more, swim into and push each other.	

		
	'Scratch' – it rubs its body against a plant.	
		
	S-shape – the individual appears to stretch, while forming an s-shape with the body.	
Not observed at National Aquarium Denmark.	Not observed at Aquarium of the Pacific.	
	Camouflage behaviour – the individual attempts to blend in with the plants.	
		

	Group bundling – 3 or more individuals are entangled and swim into and push each other.	
		
	‘Yawn’ – the mouth opens and a small pouch under the head unfolds.	
		
	Reverse curling – the individuals heads and tails, are facing opposite one another.	
No photographic evidence from National Aquarium Denmark.		No photographic evidence from California Academy of Sciences – Steinhart Aquarium.

Enrichment at the Elephant House

Holger Wisbøl

Copenhagen Zoo

*I would like to present some of the objects we use as enrichment at the elephant house.
It would be a poster with lots of pictures and descriptions of the various objects.
Meant as a means to share and get inspiration about enrichment.
Examples are different kinds of feeders, sand mounds, blue plastic barrels and so on.*

The Two Faces of the Medal: Animal Training and Welfare in Ring-Tailed Lemurs (*Lemur catta*)

Barbara Regaiolli¹; Consuelo Scala²; Caterina Spiezio¹

¹ Research & Conservation Department, Parco Natura Viva – Garda Zoological Park, Bussolengo (VR), Italy.

² Department of Biosciences, University of Parma, Parma, Italy.

Nowadays, training is widespread among modern zoos and represents an optimal way to improve animal care and management. Despite the evidence that training is beneficial for animals and caregivers in daily husbandry and research, few studies considered the implications of training on animal behavior and welfare. This research aims at investigating the effect of a temporary isolation training period on the behavior of a captive colony of ring-tailed lemurs (*Lemur catta*) housed at Parco Natura Viva, Italy. Each lemur was gradually required to enter a training area and retrieve rewards in isolation from conspecifics. Data about individual and social behaviors as well as performance and reaction to the trainer requirements were collected before, during and after the training period. A continuous focal animal sampling method was used. Results of this study underline that each lemur seems to respond differently to the training in terms of stress level, time necessary to get used to the new situation and task acquisition. However, the stress level displayed during the training sessions disappeared outside the training area. Furthermore, since affiliative behaviors were displayed more after the training sessions, training seems to be enriching for ring-tailed lemurs. This study highlights that training could be an optimal strategy not only for animal management and research but also for psychological well-being and social cohesion.

Introduction

Nowadays, training is widespread among modern zoos and represents an optimal way to improve animal care and management. Specifically, positive reinforcement training (PRT) is commonly used to train animals to voluntarily cooperate with husbandry, research and veterinary procedures, facilitating management while reducing stress-related behaviors (Prescott & Buchanan-Smith, 2003; Laule & Whittaker, 2007). Rewarding the performance of one action increases its likelihood to be displayed again, causing an individual to comply with a requested behavior (Skinner, 1981). The voluntary cooperation that could be achieved through PRT seems to benefit the animals in terms of desensitization to stressful and fear-provoking events (Reinhardt, Cowley, Scheffler, Verstein & Wegner, 1990), improvement of animal welfare by providing mental stimulation through learning and work opportunities (Laule & Desmond, 1992), increase and improvement of the human-animal interactions (Hosey & Melfi, 2012).

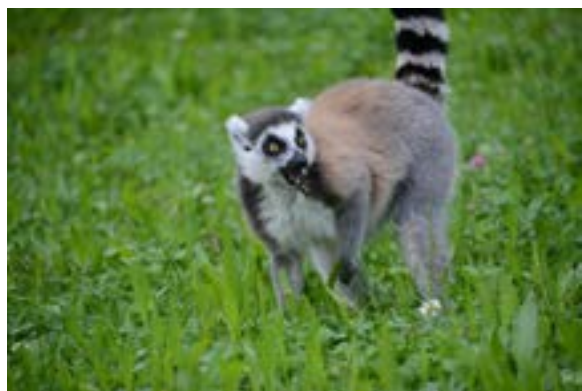


Figure 1: Zeno, a male ring-tailed lemur hosted at Parco Natura Viva.

Despite the evidence that training is beneficial for animals and caregivers in daily husbandry and research, few studies considered the implications of training on behavior and welfare (Melfi, 2013). To establish the welfare and well-being of animals in captivity ethological parameters could be used, allowing to observe whether species-specific behavioral patterns are performed or abnormal behaviors are present (Hosey *et al.*, 2009).

This research aims at investigating the effect of a temporary isolation training on the behavior of a captive colony of ring-tailed lemurs (*Lemur catta*) (Fig.1) housed at Parco Natura Viva, Italy, by considering the performance of species-specific ap-

appropriate behaviors.

Materials & Methods

The subjects of this study were 11 adult ring-tailed lemurs hosted at Parco Natura Viva (VR), Italy. The colony was made of five males and six females. The lemur enclosure was made of an indoor and an outdoor area. Training sessions took place in a small room (training area) linked to both the indoor and the outdoor areas of the enclosure through guillotine doors (Fig. 2).

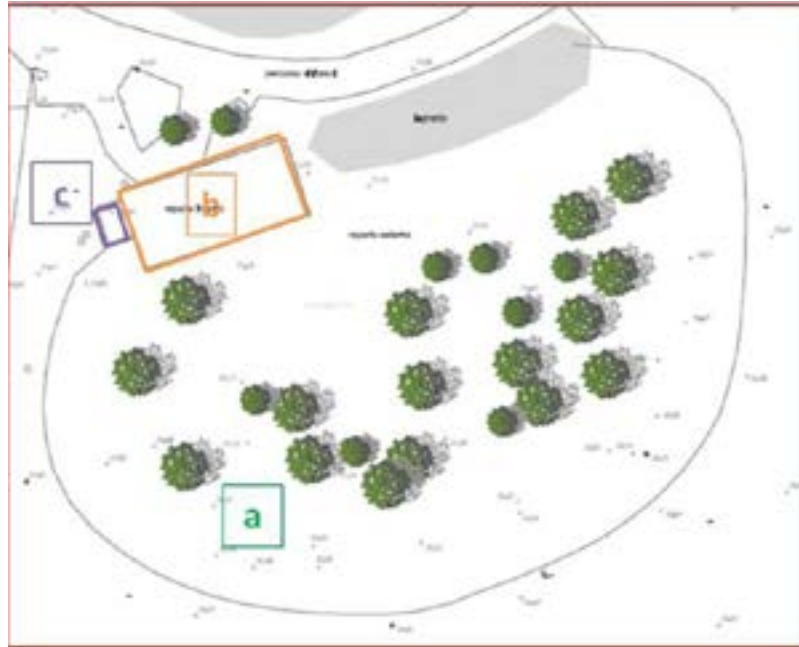


Figure 2: the lemur enclosure: a) outdoor area; b) indoor area; c) training area (guillotine doors linked this area to both the indoor and outdoor areas).

During the training session, each lemur was required to enter the training area and retrieve rewards in isolation from conspecifics. The reward was given to the lemurs when they were calmly sitting on a platform fixed to the mesh of the training area.

The study consisted of two different periods: the baseline and the training period. The baseline was carried out before the beginning of the training program (lemurs were unfamiliar with the training area); eighteen 10 min. sessions per subject were run. The training period was carried out during the training program; eighteen 10 min. sessions per subject were run after each training session, when all the subjects were altogether. During the baseline and the training period data about individual and social behaviors were collected through the direct observation of subjects in their social context.

In addition, during the training sessions, a further data collection regarding lemur response within the training area was done. Nine sessions per individual were carried out and all sessions were video-recorded. Per subject, data about the latency to enter the training area, to retrieve the reward and the duration of stress-related behaviors (scratching, defecating, stereotypes) were collected;

Between the baseline and the training periods, different steps in which lemurs were habituated to the training area were done. In the first step (which lasted about 5 days), all the lemurs were allowed to enter the new area and retrieve rewards from several plastic glasses hanged to the mesh; in this case, the guillotine doors linking the training area to both the indoor and outdoor areas of the enclosure were opened. Successively, in the second step (which lasted about 5 days) only 3 or 4 lemurs were allowed to enter the training area and retrieve the rewards. In this case, the guillotine doors were closed and lemurs were isolated from conspecific. In the final step, lemurs were allowed to enter the training area one at a time and the data collection about the effect of the training sessions on lemur behaviors and response started. Each session lasted no more than 3 minutes, to avoid the overstress of the lemurs.

Data were analyzed using non-parametric statistic tests; significance level was set at $p < 0.05$.

Discussion & Conclusion

First, our results highlighted that species-specific individual and social behaviors were performed by the colony; in particular, regarding social interactions, affiliative behaviors were expressed more than agonistic behaviors. The presence of appropriate behaviors and mainly positive interactions between the members of the colony suggest a good welfare of the study lemurs (Hosey *et al.*, 2009).

An effect of the training on the study ring-tailed lemurs was the increase of inactive behaviors in the training than in the baseline period. This result is partially inconsistent with previous literature about nonhuman primate training, reporting an increase of the activity level of the animals as a consequence of training (Desmond *et al.*, 1987; Bloomsmith, 1992; Laule, 1993; Spiezio *et al.*, 2015). However, the rise in inactivity reported in this study could be due to the need to rest after the training requirements and mental stimulation.

Another effect of training on the ring-tailed lemurs of this study is the increase of affiliative behaviors (Fig. 3), which are displayed significantly more in the training than in the baseline period. This finding is in agreement with other studies about the impact of training on animal welfare, providing further evidence that this technique could be beneficial for the overall well-being and sociality of primates in captivity (Desmond *et al.*, 1987; Bloomsmith, 1992; Laule, 1993; Manciocco, Chiarotti & Vitale, 2009; Spiezio *et al.*, 2015).

Regarding the behavior of the lemurs during the training sessions, our results show that each individual seems to respond differently to the training condition. At one level of analysis, the lack of a signifi-



Figure 3: some of the ring-tailed lemurs housed at Parco Natura Viva. One of the effect of the training on lemur behavior seems to be an increase of affiliative behaviors, such as grooming and social contact.

cant negative correlation between training sessions and both the latency to enter the training area and the performance of stress behaviors suggest that habituation to a new area and to isolation from conspecific is not so easy for lemurs to be achieved. On the other hand, the trend toward the decrease in the latency to retrieve the reward seems to underscore that trust between trainer and lemurs is quite easy to build. Presumably, more than 9 sessions should be done to adequately train lemurs to cooperate during an isolation training protocol.

In conclusion, PRT training seems to be a useful technique to improve animal husbandry and welfare in captivity, not only during the training sessions but also in the daily social environment.

References

- Bloomsmith, M. (1992). Chimpanzee training and behavioral research: A symbiotic relationship. In *Proceedings of the American Association of Zoological Parks and Aquariums Annual Conference* (pp. 403–410). Toronto, Ontario, Canada: American Association of Zoological Parks and Aquariums.
- Desmond, T.; Laule, G.; McNary, J. (1987). Training for socialization and reproduction with drills. In *Proceedings of the American Association of Zoological Parks and Aquariums* (pp. 435–441). Wheeling, WV: American Association of Zoological Parks and Aquariums.
- Hosey, G. & Melfi, V. (2012). Human-animal bonds between zoo professionals and the animals in their care.

Zoo Biology, 31, 13-26.

Hosey, G.; Melfi, V.; Pankhurst, S. (2009). *Zoo Animals Behavior, Management and Welfare*, Oxford University Press, Oxford.

Laule, G. (1993). The use of behavioural management techniques to reduce or eliminate abnormal behaviour. *Animal Welfare Information Center Newsletter*, 4: 1-11.

Laule, G. & Desmond, T. (1992). Addressing psychological well-being: training as enrichment. *Proceedings of the American Association of Zoological Parks and Aquariums Annual Conference*, 415-422. Toronto, Canada.

Laule, G. & Whittaker, M. (2007). Enhancing nonhuman primate care and welfare through the use of positive reinforcement training. *Journal of Applied Animal Welfare Science*, 10: 31-38.

Manciocco, A.; Chiarotti, F.; Vitale, A. (2009). Effects of positive interaction with caretakers on the behaviour of socially housed common marmosets (*Callithrix jacchus*). *Applied Animal Behaviour Science*, 120: 100-107.

Melfi, V. (2013). Is training zoo animals enriching? *Applied Animal Behaviour Science*, 147: 299-305.

Prescott, M. J. & Buchanan-Smith, H. M. (2003). Training nonhuman primates using positive reinforcement techniques. *Journal of Applied Animal Welfare Science*, 6: 157-161.

Reinhardt, V.; Cowley, D.; Scheffler, J.; Vertein, R.; Wegner, F. (1990). Cortisol response of female rhesus monkeys to venipuncture in homecage versus venipuncture in restraint apparatus. *Journal of Medical Primatology*, 19: 601-606.

Skinner, B. F. (1981). Selection by consequences. *Science*, 7: 501-504.

Spiezio, C.; Piva, F.; Regaiolli, B.; Vaglio, S. (2015). Positive reinforcement training: a tool for care and management of captive vervet monkeys (*Chlorocebus aethiops*). *Animal Welfare*, 24(3): at press.

Providing New Opportunities for Hand-Reared Chimpanzees: Integration into a Social Group

Caterina Spiezio¹; Barbara Regaiolli¹; Martina Girardi²; D. Frasson^{1,3}; P. Accorsi²

¹ Research & Conservation Department, Parco Natura Viva – Garda Zoologica Park

² Dipartimento di Scienze Mediche Veterinarie, Università degli Studi di Bologna, Italy

³ Conservation Manager, Tacugama Chimpanzee Sanctuary

To provide the opportunity for normal species-specific behaviours, captive chimpanzees should be housed in social groups and the introduction of new social partners could be useful to reproduce fission-fusion social organization. In particular, hand-reared chimpanzees should be introduced in a social group in order to perform species-specific behaviours. Behavioural research on integration procedures and on the acceptance of hand reared-chimpanzees by the group is needed.

The aim of this study was to assess the behaviours of a colony of chimpanzees, housed at Parco Natura Viva (Italy), during the introduction of hand-reared individuals. A focal animal continuous sampling method was used to collect data about individual and social behaviours of chimpanzees. Forty eight 10-minute sessions per subject were run. Results underline that all chimpanzees performed species-specific individual and social behaviours; in particular, the hand-reared individuals displayed affiliative behaviours toward conspecifics such as social play, grooming and approach. Finally, the behaviours displayed by the hand-reared chimpanzees seem to indicate that they adapted well to the new group as the integration progressed. In conclusion, the hand-reared chimpanzees seem to be successfully integrated into the group by engaging in positive social interactions with all group members.

Introduction

Rejections of infants among non-human primates occasionally occur in the wild as well as in captive settings. Hand-rearing of captive infant chimpanzees becomes necessary in situations where mother-rearing is not possible, but might have negative behavioral consequences. Early introduction of hand-reared chimpanzees into a group of conspecifics appears to reduce the negative consequences of hand-rearing, but the process of integration is not well studied (Bashaw *et al.*, 2010). Expression of species-specific behaviors of captive animals is an indicator of animal welfare, and considering ethological parameters, is an optimal non-invasive technique to assess animal welfare (Hosey *et al.*, 2009). Behavioral research on integration procedures and on the acceptance of hand reared-chimpanzees by the group is needed.

The integration of the hand-reared chimpanzees was a long and complex process. Each hand-reared chimpanzee was gradually introduced into the parent-reared group by familiarizing him with few individuals at one time and then releasing all subjects in the main group after positive social relationships were built. The design of the chimpanzee indoor enclosure facilitated the introduction process. The chimpanzee enclosure is made of a large lounge, housing the main group of parent-reared chimpanzees, and several small rooms in communication with each other through guillotine doors, in which hand-reared chimpanzees were hosted. The lounge was adjacent to a small room and near to the other rooms so that all chimpanzees were in auditory and visual contact thanks to a wire mesh. This design allowed the chimpanzee keepers and the researchers of Parco Natura Viva to monitor the relationships between parent-reared and hand-reared chimpanzees, thus identifying the most suitable subjects for the familiarization before the introduction. Furthermore, the design of the enclosure and the fact that all rooms were linked through guillotine doors facilitated the movement of the subjects between all the different areas of the enclosure. Finally, the chimpanzee out-

door enclosure is large and naturalistic, with several hiding places, plants, towers, ropes and other gadgets (Fig. 2), allowing the animals to manage their relationship with both conspecifics and visitors.

This study aims at investigating the behaviors of a colony of chimpanzees during the integration of hand-reared individuals.



Figure 1: Group of chimpanzees at Parco Natura Viva.



Figure 2: The outdoor enclosure of the chimpanzees housed at Parco Natura Viva, Italy.



Figure 3: The female chimpanzee Giorgina with her daughter Madax. Madax was reared by Giorgina with the precious support of Luisa, her grandmother. All members of the colonies, both hand- and parent-reared, take care of her well-being and good development

Materials & Methods

The subject of the study was a colony of 12 chimpanzees (*Pan troglodytes*), housed at Parco Natura Viva - Garda Zoological Park, Bussolengo (VR), Italy (Fig. 1; Fig. 3). The colony was composed of six hand-reared chimpanzees (two males and four females of different ages) and six parent-reared female chimpanzees of different ages.

To verify the integration of these chimpanzees in the social group, individual and social behaviors of the members of the colony were observed. Focal animal continuous sampling method was used to collect behavioral data during 10-minute sessions for a total of 48 sessions per subject (576 sessions in total).

Data were analyzed using non-parametric tests (significance level $p < 0.05$) (Siegel & Castellan, 1992).

Conclusion

Results of this study show that species-specific individual and social behaviors were performed by all individuals; in particular, the hand-reared individuals displayed affiliative behaviors toward conspecifics such as social play, grooming and approach. Therefore, a good level of welfare could be assessed (Hosey *et al.*, 2009). The hand-reared chimpanzees' behavior patterns indicate that they adapted well to the new circumstances in the chimpanzees' group as the integration process progressed (Bashaw, 2010).

In conclusion, the hand-reared chimpanzees seem to be successfully integrated into the group by

engaging in positive social interactions with all group members (Pazol et al.,1998; Goodall, 1986).

References

Bashaw, M. J., Gullott, R. L. Gill, E. C. (2010). What defines successful integration into a social group for hand-reared chimpanzee infants? *Primates*, 51: 139-147.

Goodall, J. (1986). *The Chimpanzees of Gombe: Patterns of Behavior*. The Belknap Press of Harvard University Press, Cambridge.

Hosey, G. R., Melfi, V., Pankhurst, S. (2009). *Zoo Animals: Behaviour, Management and Welfare*. Oxford University Press, Oxford.

Pazol K, McDonald S, Baker K, Smuts B (1998). Placing hand-reared chimpanzees (*Pan troglodytes*) into adult social groups: a technique for facilitating group integration. *Laboratory Primates Newsletter*, 37: 11–13.

Siegel, S., Castellan, N. J. (1992). *Statistica Non Parametrica*. McGraw-Hill Libri, Italia.

Shark Training at Kattegatcentret

Rune Kristiansen

Kattegatcentret, Denmark Shark Center

Since the spring of 2011, Kattegatcentret (Denmark) have dedicated time to train three bottom dwelling sharks – two nurse sharks (*Ginglymostoma cirratum*) and one zebra shark (*Stegostoma fasciatum*). The training takes place in the shallow part of a multispecies shark tank where other big sharks do not enter. The three sharks are trained to come at defined individual stations on a plateau in shallow water during the daily training session.

Besides daily health care checkups, one nurse shark has also been trained to turn around on its back on command making the abdomen accessible for examination. The training gives many opportunities of both management and proactive health care and is also part of the public daily shark feeding.

INTRODUCTION

Management of a big multispecies shark tank has its challenges regarding general husbandry practices and animal welfare. To meet some of these challenges, training and conditioning of sharks (and other fish species) are becoming increasingly more common among public aquariums in order to aid the captive management of sharks with regard to better husbandry practices.

Kattegatcentret opened in 1993 and has for 20 years been the only public aquarium in Denmark with big tropical sharks (+1m). The 550,000 liter shark tank contains one sandtiger (*Carcharias taurus*); three sandbar sharks (*Carcharhinus plumbeus*), two nurse sharks (*G. cirratum*); one zebra shark (*Stegostoma fasciatum*); five black tip reef sharks (*Carcharhinus melanopterus*) and two southern stingrays (*Dasyatis americana*). Most of the sharks have been here since 1993.

The sharks are offered food on a daily basis during the public shark feeding with educational speak. Every shark is target fed so individual feed records are met. Until the start of the training program (2011) all the sharks were fed at the same place (feeding podium) sometimes with chaos and where the risk of biting each other could occur. As part of the training purpose we would like to lower the pressure from this podium by introducing another feeding (and training) station for specific sharks.

As the shark tank is open from above and public accessible, the choice of the new training station was at the shallow end of the tank – a secure area where the big sharks do not enter and where only the smaller sharks (bamboo sharks) and other fish enter and are also fed safe away from the big sharks.

MATERIALS AND METHODS

Selected species

The three bottom dwelling sharks were chosen because they are not obligate RAM ventilators (they do not have to constantly swim to breath) which allow other training possibilities when laying still.

Nurse sharks (*Ginglymostoma cirratum*)

- Two males
- Individuals recognizable by color
- Arrived in 1993
- Very food motivated

Zebra shark (*Stegostoma fasciatum*)

- One male

- Arrived in 2008

Training equipment

- Waders
- Feeding tong
- Daily feed amount divided in many small pieces of feed (rewards)
- Auditory call signal
 - o Polynesian inspired “shark rattle” made of coconut shells
- No bridge used – direct rewarding

The training takes place on a daily basis with at least one training session of approximately 15-20 minutes.

Training methods and development

The training session is initiated with an auditory signal. A Polynesian inspired “shark rattle” made of coconut shells was made and used with success (sharks hear low sounds frequencies).

The training program relies primarily on positive reinforcement of successive approximations to a behavioral goal. Food was initially presented on the edge of the new training podium, then further up and ultimately with a large portion of the body out of the water. When the sharks reached the desired point on the podium we began to extend the time period before the shark received the fish reward. After approximately 2 months the two nurse sharks were consistently stationed on the podium at individual stations for most of the training session duration. Then we started introducing desensitizing for tactile manipulation. Again the sharks were rewarded directly after an exercise (for example touch/tactile examination). The other shark(s) are also rewarded for waiting calm on the station.

One of the goals by the tactile manipulation and desensitizing was to get access to the ventral side (abdomen) of the shark for potential veterinary examinations. But during the process it was decided to try and train the shark to turn around by itself on command. Again through approximations the food was first presented on the side of the mouth so the shark needed to turn a little to get the reward. Ultimately (after 3 months) when touched on the tip of the nose with some food – the shark rolled over on its back making abdominal examinations accessible. We slowly extended the time period of laying calmly on the back before rewarding, this way we had sessions with over 5 minutes of lying calm on the back. Tonic immobility sometimes appeared making the duration on back even longer.

The zebra shark was introduced to the same training as the nurse sharks but apparently this species takes a longer time and is in general a bit more “clumsy”. The shark will swim laps - come to the podium to get a few rewards, then swim a lap or two and comes back again. But tactile manipulation and examination is accepted by the shark during station training.

RESULTS & CONCLUSIONS

The training results have proven valuable as we have gained more control in overall husbandry and feeding management of the sharks. For the three trained sharks – we can now just call them to the podium at any time for veterinary health check-ups or other purposes. The veterinary accessibility on the voluntary basis by the sharks is a big advantage, as we do not need to catch the sharks for this purpose and therefore can avoid stress and risk of hurting itself in the process. Occasionally wounds can also be followed close up and treated without disturbance.

The training is under control (watch video – link below). The sharks know their individual stations; if one enters wrong, it is ignored for approx. 5 seconds by the trainer before a reaction of swimming back and to the right station begins. We have not experienced any safety risks for the trainer by the trained sharks or by other sharks (for example the black tip reef sharks) as they keep their distance. Bamboo sharks (small bottom dwelling sharks) may be attracted by the smell, but it is important that they do not find any spilled food as it could act as a reward.

Last we have also gained a secondary goal as many of our guests have a changed view on sharks after seeing the shark training. Coming to see the “man-eating monster” they are leaving impressed and with a more nuanced view on these fascinating but general vulnerable animals.

FUTURE PLANS & PERSPECTIVES

Introduce target training

- Allows movement from “A to B”

Stretcher training

- Allows weighing and transport

Video on youtube – Shark training example from Kattegatcentret

<https://www.youtube.com/watch?v=nBjNZa1Ekuc>



Events

Pre-Conference Trip Givskud Zoo



Full Day Workshop

Raising the Bar: Contemporary Animal Training **Steve Martin, CEO, CPBT-KA and Susan Friedman, PhD**

Specially designed for all levels of animal care professionals, this new workshop provided a unique opportunity to learn contemporary animal training technology from two necessary and compatible perspectives - the natural science of behavior change and the ethical principle, "least intrusive alternative." The workshop will focus on three main goals:

1. How to train new behaviors, strengthen existing behaviors, and replace problem behaviors using positive reinforcement.
2. How to establish motivation through the use of trust accounts, empowerment, reinforcer management (including secondary reinforcers and diet delivery), environmental set up and clear cues.
3. The key features of inspiring action through educational programs and presentations.

Two hands-on exercises will provide practice, shaping, and behavior problem solving and a great opportunity to network with friends and colleagues in a safe learning environment.



Silent Auction



Copenhagen Zoo



Poster Night at the Blue Planet



Career Night



This informative evening is hosted by the Education Committee. A panel of experienced animal professionals answered questions from attendees. They provided tips on how to find jobs, write resumes, and confidently get through an interview. The panel also provided suggestions about how to advance in your career.

Booksigning Event

Animal Training 101: The Complete and Practical Guide to the Art and Science of Behavior Modification Dr. Jenifer Zeligs

Animal Training 101, the first handbook of its kind, finally offers a complete marriage of the science of animal behavior and the practical art of animal training. In one comprehensive volume, this approach is presented in a simple and practical way that will be useful to both the seasoned professional and a beginning level enthusiast working with animals of any species.

Where other animal training books focus on only a few chosen techniques, Animal Training 101 thoroughly explains the entire spectrum of training methods. Dr. Zeligs provides a cost-benefit analysis of each approach, while focusing on maintaining a trusting, positive relationship between animal and trainer. This well-organized reference enables you to easily find the optimal techniques to solve your specific training challenges and to decide which techniques best suit your individual needs. It is a must-have for anyone interested in animal training in either domestic or professional settings.

This text features:

- Both the science of animal behavior and the real-life practice of animal training
- Practical information useful to train both domestic and exotic animals
- Beginning and advanced techniques
- The most comprehensive and modern glossary of terms available
- Color illustrations

Author and professional Dr. Jenifer Zeligs offers a flexible, complete, and pragmatic approach that will allow you to connect with any animal in a mutually satisfying way.





Elephants-A Way Forward

Rudi van Aarde

Indecision driven by differences of opinion and a lack of knowledge on how to protect and manage Africa's elephants is at the core of conservation conflict. In general supporters of the intrinsic value of nature wish minimal interferences, while those lobbying for economic gains for society argue in favour of extractive uses such as trade in ivory and trophy hunting. The latter often also calls for the control of elephant numbers through culling, while the former wishes conservation to rely on natural processes with minimal interference from people. At the stake of this conflict is the well-being and persistence of Africa's elephants, especially in the wake of habitat loss, political conflict, improper governance and other criminal activities and the consequences that climate change is holding for elephants.

Scientists also disagree on how to best conserve elephants and other species in a changing world. Their disagreements unfortunately play into the hands of political indecision and the consequent application of political agendas that, for instance, plague CITES and related efforts of many NGOs to contribute to the conservation of elephants and other species valued by society. Despite these disagreements elephants continue to dominate protected areas across most of sub-Saharan Africa. Here they symbolises conservation successes and failures, act as keystone species, modify and maintains savannah vegetation and related ecosystem functions, contribute to regional and local economies and come into conflict with people. Their future hinges to some extent on our abilities to cater for their needs. To do so we need to know how elephants will respond to the changing world we are living in. Our interpretation of their responses to habitat loss, conservation management interferences natural ebbs and flow of living conditions and climate change therefore make conservation sense, especially when founded in ecological principles that relates to the interactions between species and their environment. I therefore will present our findings based on some 20 years of research on free-ranging elephants across several southern African countries and use behavioural, physiological and ecological information gained through active field research to evaluate individual, population and meta-population responses to prevailing and predicted living conditions with emphasis on the influence of people, management and climate change on the future well-being of elephants.

Odense Zoo



A Night Out in Odense



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”.

A Chicken's Choice: Positive Reinforcement Training Versus Free Food
Anaka Nazareth, Maymont Foundation



Poster Presentation Award

Recognizes the best poster that represents an achievement in any of the above categories in this format.

From Traditional Falconry to Training with Positive Reinforcement with Birds of Prey
Anne Christensen and Sigyn Ørum-Rasmussen, Copenhagen Zoo



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.

An African Adventure: Raising Awareness through R+ Training Methods
Barbara Glatz, Animal Training Center



Animal Welfare Advancement Award

Recognizes achievements that enhance animal welfare through specific environmental enrichment/conditioning techniques or programs.

Let's Get Physical

Valerie J Hare and Mark Kingston Jones, The Shape of Enrichment, Inc.



Behavioral Management Innovation Award

Recognizes outstanding application of novel, unusual or original behavior management technique.

Positive Reinforcement as a Replacement of the Antique Training Methods at Elephant Camps in Asia
Gerardo Martinez and John Roberts, Golden Triangle Asian Elephant Foundation and African Safari



Behavioral Management Achievement Award

Recognizes an outstanding achievement in the application of behavior management techniques.

When Scent Training Makes Sense: Seeing the World through a Dog's Nose
Anna Oblasser-Mirtl, Animal Training Center



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.

Positive Reinforcement as a Replacement of the Antique Training Methods at Elephant Camps in Asia
Gerardo Martinez and John Roberts, Golden Triangle Asian Elephant Foundation and African Safari



Member's Business Meeting

Annual Member Business Meeting Minutes
April 15, 2015
Copenhagen, Denmark

- I. Call to order at 12:30pm Denmark time by Margaret Rousser.
- II. Minutes recorded by Heather Samper.
- III. Opening comments (Margaret Rousser) Thank you to Copenhagen Zoo for such a warm welcome! Steffen Straede, director of Copenhagen Zoo, welcomed attendees and thanked Kirstin and Annette for all their hard work preparing the conference for the past several years. Animal training is high on their priority list and is something they focus on and hope you see that. He is pleased we've also added a conservation link to our conference.
- IV. Acceptance of the minutes from the 2014 member business meeting.

MOTION made by Margaret Rousser to accept the 2014 member business meeting minutes, having been reviewed in advance. Second made by Tim Sullivan. **Motion passed by unanimous consent.**

- V. Board reports
 - A. President report (Margaret Rousser) We are having a fantastic conference! Thanks to Annette, Kirstin, and Copenhagen Zoo!
 - B. CFO report (Susie Ekard)
 - i. 2014 Financial report – see below.
 - ii. Amazon Smile- We made \$10. Encouraged membership to purchase through Amazon Smile, it's new for us but an easy (free) way for the organization to earn money.
 - C. Past President (H. Samper)
 - i. Election results
 - 1. Review of election process- We have board nominations in the fall. From the nominations received, the board discusses at midyear what positions need to be filled and creates a slate based on nominations received. If needed, a slate for executive board and a direct election for directors at large can be created.
 - 2. Incoming board members as a result of the 2014-2015 election: Cathy Schlott, Kelly Elkins, Christa Gaus, Darren Minier, Justin Garner
 - D. President Elect (Nicki Boyd)
 - i. Program Council Chair introductions- Reminder of our program council meeting tomorrow from 4-5pm. These are volunteer positions. If you're interested in getting involved in the ABMA more, this is a great place to start. Feel free to contact any of these chairs.
 - 1. Behavior Management Fund- Genevieve Warner, Middleburg Humane Society
 - 2. Conference- Justin Garner, Busch Gardens Tampa and Maura Davis, Lowry Park Zoo
 - 3. Conference Content Advisory- Christine McKnight, Minnesota Zoo
 - 4. Conference Proceedings- Jennifer Hickman, Denver Zoo
 - 5. Education- Missy Lamar, Sea World San Antonio

6. Government Affairs- Justin Garner, Busch Gardens Tampa
 7. Honors and Awards- Jennifer Hennessey, Roger Williams Park Zoo and Scott Trauger, Lowry Park Zoo
 8. Membership- Amy Schilz, Cheyenne Mountain Zoo
 9. Merchandise- Susie Ekard, San Diego Safari Park
 10. Nominations and Elections- Margaret Rousser, Oakland Zoo
 11. Public Affairs- Margaret Rousser, Oakland Zoo
 12. Publication- Heidi Hellmuth, St. Louis Zoo
 13. Research and Evaluation- Darren Minier, Oakland Zoo; looking for a new chairperson for this committee
 14. Site Selection- Kelly Elkins, San Diego Zoo
 15. Sponsorship- Cathy Schlott, National Aviary
 16. Website- Heather Samper, Mutts With Manners
- E. 1st VP (Annette Pedersen)
- i. Thank you to all our sponsors Copenhagen Zoo, Odense Zoo, Blue Planet, Southern Denmark University, MyTrainingStore.com, Zooprofis, Mazuri, Zooply SeaWorld, & Animal Behavior Institute (R&E workshop), Givskud Zoo, Adventura. Steve Martin and Susan Friedman donated proceeds from workshop. Thank you also to our extended talk speakers- Steve Martin, Susan Friedman, Ken Ramirez, Sabrina Brando, Barbara Heidenreich, and Jenifer Zelig.
 - ii. Thank you to our conference hosts- Copenhagen Zoo and Odense Zoo.
 - iii. Conservation project support –. Rikkitikki is the organization we're donating to. Elephant on parade figurines are in each bag. Money supports Asian elephants.
- F. 2nd VP (Scott Trauger)
- i. Announce 2016 conference in Tampa April 13-18. There will be a presentation at the end of the conference on Saturday. Several same features and some new ones.
- G. Announce 2017 conference in Cincinnati (Kelly Elkins) We have a hotel and dates. Check the website for details as they become available.
- H. Secretary (Heather Samper on behalf of Cinnamon Williams)
- i. Membership update - Total Members: 366; Associate- 64, Active- 44, Emeritus- 5, Professional- 240, Lifetime- 13
 - ii. Members by countries: Total Countries: 23; United States- 269, Australia- 4, Austria- 3, Belgium- 2, Canada- 12, China- 3, Czech Republic- 3, Denmark- 10, Finland- 2, France- 4, Hong Kong- 1, Japan- 1, Korea- 1, Mexico- 4, Netherlands- 11, Netherlands Ant- 1, Norway- 1, Philippines- 1, Portugal- 1, Singapore- 2, Spain- 1, Sweden- 2, United Kingdom- 28.
- I. BMF Travel Scholarship (Cathy Schlott) We offer a scholarship to provide support for a presenter who may not otherwise be able to attend. An application and abstract are due before the normal deadline for abstracts. Congratulations to travel scholarship winner for 2015 conference, Anaka Nazareth! 50% of silent auction proceeds to go to the BMF to assist for the next year's winner.
- J. Proceedings Committee (Jennifer Hickman) If you are presenting please email your papers so we can get the proceedings out as soon as possible. This is a member benefit. We compile a more detailed document on all the presentations for each conference, so it's important to get those to Jen as soon as possible to be included in the Denmark proceedings.
- K. Publications Committee (Heidi Hellmuth) Please send submissions. They can be pictures, papers, or short blurbs on something you are doing. Heidi is a very relaxed editor.
- L. Conference Content Advisory Committee (Jennifer Hickman on behalf of Christine McKnight) different levels of certifications for trainers. Continuing education credits for this conference: We were awarded 28.5 CEUs from IAABC, 18.5 CEUs for trainers and 16 for behavior consultants from CCPDT and 30 CEUs from IATBC. A second application was submit-

ted to IATBC for the Martin/Friedman pre-conference workshop and was awarded 8 CEUs. For attendees seeking CEU's, we are pleased to announce that IAABC has awarded 28.5 CEUs; IATCB has awarded 30 CEUs for the conference and 8 for the pre-conference workshop; CCPDT has awarded 18.5 CEUs for trainers and 16 CEUs for behavior consultants.

M. Site Selection (Kelly Elkins)

- i. Call for host cities 2018, 2019- Let's think ahead and if you are interested in hosting a conference please see Kelly. We would like to continue our presence in Europe and again if you're interested see Kelly.

VI. Old Business

- A. CollaborNation (Christa Gaus) This is a free member benefit. It's an online E Learning tool with a variety of resources including webinars.
- B. Trademark Update (Heather Samper) –. We submitted an application last year. We received an office action late 2014, which was submitted in March 2015. Current status by USPTO is "Approved by the examining attorney for publication but has not yet been published for opposition. Although rare, withdrawal of approval prior to publication may occur after final review. The opposition period begins on the date of publication."
- C. Website Update (Heather Samper) – Please send feedback as to what you do and do not like on the website. This is your website and I will do all I can to accommodate your requests. There's been a bit of a learning curve since switching over to the new website last May but I feel fairly confident updating the site as needed. New- conference and registration was a new system, changed servers for faster connection speeds especially for our international members, auto renewal for membership, in memoriam, job postings, and front page pictures by you- send us more and get featured on the front page. Looking into member directory, making the calendar of events more user friendly, meshing CollaborNation into our site, and adding a Wellspring annual subscription membership.
- D. AAZK Updates (Heather Samper) – Joint membership is something both organizations are interested in but we are waiting for technology to catch up to make it easier for administrators of both organizations. A joint raptor workshop is in the works for the near future. Looking into doing paper swaps again for the second year in both organizations' publications.

VII. New Business

- A. Acknowledgement of outgoing board members (Margaret Rousser) All board members serve on a volunteer basis and we thank them for their time.
 - i. Heather Samper
 - ii. Christa Gaus
 - iii. Jennifer Hickman
- B. Acknowledgement of 2014-2015 board members (Margaret Rousser)

President- Nicki Boyd	CIO- Darren Minier
President Elect- Cathy Schlott	Director- Missy Lamar
Past President- Margaret Rousser	Director- Jay Tacey
Secretary- Cinnamon Williams	Director- Annette Pedersen
CFO- Susie Ekard	Director- Justin Garner
1 st Vice President- Scott Trauger	
2 nd Vice President- Kelly Elkins	

- C. Outgoing president comments (Margaret Rousser) Thank you again to all our sponsors and attendees for making this Denmark conference a success!

VIII. Motion to adjourn

MOTION made to adjourn 2015 member business meeting at 1:04pm Denmark time by Margaret Rousser. Second by Heidi Hellmuth. **Motion passed by unanimous consent.**

ABMA Business Meeting Financial Summary for 2014

Income		Expenses	
Interest	\$125.23	Bank/CC fees/Autho- rize	\$6,124.19
Merchan- dise	\$3,143.74	Accounting/Admin	\$2,113.20
Conference (incl spon- sors)	\$88,112.86	Merchandise	\$2,096.88
Amazon Smile Donation	\$10.00	Taxes (sales/prep)	\$768.37
Membership Dues	\$15,945.00	2014 Conference	\$70,864.71
BMF Proceeds	\$1,409.75	2015 Conference	\$2,000.00
Total	\$108,746.58	Insurance	\$817.00
		Legal Fees	\$494.00
		Website (design/host)	\$4,122.00
		BMF Expen- ses	\$1,515.00
2014 Fiscal Summary		Donations	\$600.00
Income	\$108,746.58	Sponsor (Twycross)	\$1,852.00
Expenses	(\$99,367.35)	Cypherworx licensing	\$6,000.00
Total Income	\$9,379.23	Total	\$99,367.35

Account Balances as of 12/31/14

Business Checking	\$51,746.25
Capital One Investment	\$41,804.91
Business Savings (Beh Mgmt Fund)	\$10,763.81
Conference Checking	\$21,619.73

Ending Balance	\$125,934.70
-----------------------	---------------------

Thank You Sponsors



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

2014 Proceedings Committee members:

Ann Lablans
Christina Lavallee
Cindy Wilson
Jane Anne Franklin
Peggy Hoppe
Stacie Marchionne
Dr. Susan Friedman
Jessica Robinson
