A Survey of Captive Wild and Exotic Animal Training Programs in the Eastern United States

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A Senior Thesis submitted in partial fulfillment
of the requirements for graduation
in the Honors Program
Liberty University
Spring 2023

Acceptance of Senior Honors Thesis

This Senior Honors Thesis is accepted in partial
fulfillment of the requirements for graduation from the
Honors Program of Liberty University.

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Abstract

Methods of positive reinforcement as a successful means for animal training are the result of many years of research into operant conditioning and learning. However, current literature is unclear on the extent to which these methods are utilized in captive wild and exotic animal populations in the United States. Through phone interviews with animal trainers employed at zoos and wildlife rehabilitation centers in the eastern United States, the author determined that these facilities are currently utilizing positive reinforcement training methods which are proving to be a great benefit for all parties involved. They are enabling a variety of voluntary health procedures to be conducted without anesthesia, improving keeper-animal relationships, and making animal care easier overall for the keepers.

A Survey of Captive Wild and Exotic Animal Training Programs in the Eastern United States

Around the world, animals are held in captivity in various establishments, including zoos and wildlife rehabilitation centers. These animals provide innumerable opportunities for research, conservation, and education through a public attraction. Depending on the species, a wide variety of husbandry procedures exist to ensure proper care and welfare for each animal. Not all of these animals are safe for full contact with their keepers, further deepening the difficulties of working with them beyond the existing language barrier between animal and human. Animal trainers use various methods of training to help overcome these language barriers and make easier and more efficient the husbandry procedures practiced by keepers around the world.

Background

Historical Development of Operant Conditioning

Animal training begins when the animal learns. Hosey et al. (2013) described learning as a permanent change in an animal's behavior or response to a stimulus following an experience involving that stimulus. When humans define what is to be learned and guide the process, then learning has evolved into training (Hosey et al., 2013; Kleiman et al., 2010). Modern training techniques which involve methods of positive reinforcement, to be defined later, often have their origins in the study of operant or instrumental conditioning.

The discovery of operant conditioning is recognized as originating from the experiments of two men: E.L. Thorndike and B.F. Skinner. As the 19th century drew to a close, E.L. Thorndike was conducting experiments wherein hungry cats had to escape from puzzle boxes in order to obtain food (Domjan & Grau, 2015). Thorndike's observations led to his proposal of the

Law of Effect, which describes how an association between a stimulus and response is strengthened if the response leads to a satisfying event, but the association is weakened if the response leads to an aversive event (Domjan & Grau, 2015). In this case, if a cat pressed a button that let it out of the box and gave it access to food, the cat would associate pressing the button with receiving food.

In the 1930s, Skinner observed the Law of Effect through his studies with Skinner boxes (Vargas, 2016). Skinner boxes are cages in which rats are placed and trained to press a lever which could result in various consequences (Vargas, 2016). Skinner varied the conditions in the cages, such as how much food the rats were given for each lever press, how many times they had to press the lever for food, etc. These changes allowed him to observe the change in the rats' behavior in response to their environment over a continuous length of time without getting bogged down in neurophysiological processes (Lieberman, 2000; Vargas, 2016). After five years of study, in 1938 he published a book which detailed his observations entitled *The Behavior of Organisms* (Vargas, 2016). He described the learning that he observed as operant conditioning, because the animals learn to operate on their environment, achieving their desired outcomes and results by performing specific behaviors. Skinner's Theory of Operant Conditioning stated that animals would learn which behaviors should be continued and which should not depending upon the consequence of those behaviors (Feng et al., 2016). If the consequence was beneficial or reinforcing to the animal, the animal would continue to perform that behavior (Feng et al., 2016). If the consequence was harmful or not beneficial to the animal, then the animal would likely cease to perform that behavior (Feng et al., 2016).

Throughout his life, Skinner continued to build upon his ideas. During World War II, while attempting to train birds to track German ships, Skinner used successive approximation to

train a pigeon to hit a ball around a box in mere minutes (Vargas, 2016). Successive approximation is a process whereby a behavior the animal already possesses is manipulated, possibly by adding or subtracting various aspects or honing others, until the desired end behavior is achieved (Pryor 1984; Pryor, 2009). In 1952, he used successive approximation and a camera flash to teach a dalmatian to jump up on a wall (Dorey & Cox, 2018). He first taught the dog that the flash of the camera, which was originally a neutral stimulus in that it was neither naturally good or bad for the dog, could be a desirable stimulus. He did this by repeatedly pairing the camera flash with a primary reinforcer, something that is inherently desired by the dog such as food or a treat (Kleiman et al., 2010). Through such repeated pairings, the camera flash itself became desirable to the dog as a secondary reinforcer (Kleiman et al., 2010). Skinner used this flash to communicate to the dog that whatever it was doing was good. Then, because behavior in organisms is naturally variable, Skinner continued to flash the camera as the dog looked at the wall, moved toward the wall, put a paw on the wall, and so on until the dog was jumping on the wall (Dorey & Cox, 2018).

Skinner originally explained this concept of using a marker to communicate to the animal that they were doing something correctly in an article published in *Scientific American* in 1951 (Dorey & Cox, 2018). Then, he suggested using something that creates a sound to mark the behavior because the animal could perceive the sound from further distances and not have to be looking directly at it, such as with the camera flash (Dorey & Cox, 2018). Such sound devices could be whistles, as are commonly used in marine mammal training, or clickers, small plastic devices that make a clicking sound when depressed. Marian and Keller Breland, co-workers of Skinner on his bird tracking project during World War II, synthesized behavioral technology, including what Skinner was teaching, with animal training to create Master Mind (Gillaspy et al.,

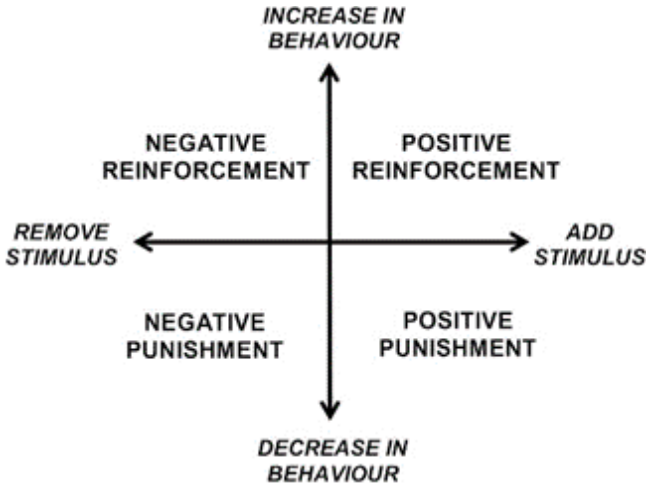
2014). Master Mind was a training program for dogs that ran through the 1950s and 60s and was the beginning of the use of clicker training (Gillaspy et al., 2014). Clicker training was also being applied to marine mammal training as early as the 1950s (Gillaspy et al., 2014). In 1984, Karen Pryor, who got her start as a trainer at Sea Life Park in Hawaii, published her own book entitled *Don't Shoot the Dog* which, along with the help of the internet, popularized the use of clickers in the animal training world and combined Skinner's operant conditioning with the latest behavioral theories and animal training (Gillaspy et al., 2014; Pryor, 1984).

Definitions

The application and use of operant conditioning in animal training involves more than a simple stimulus and a response. Before training begins, the trainers must decide upon the final behavior that the animal should be performing. They then use a combination of methods to select for the desirable behaviors and extinguish the undesirable behaviors. These methods include positive reinforcement, negative reinforcement, positive punishment, and negative punishment (see Figure 1). "Positive" signifies that the animal's response results in something being added to the situation or environment, whereas "negative" signifies that the animal's response results in something, typically aversive, being removed (Domjan & Grau, 2015; Kleiman et al., 2010; Pryor, 1984). "Reinforcement" signifies that the behavior is encouraged to persist, whereas "punishment" signifies that the behavior is discouraged and meant to be extinguished (Domjan & Grau, 2015; Lieberman, 2000; Pryor, 1984). Interestingly, because positive reinforcement is generally desirable to an animal, if positive reinforcement is withheld it could act as a punishment for the animal (Domjan & Grau, 2015; Skinner, 1938). However, withholding negative reinforcement has the opposite effect of actually rewarding the animal (Skinner, 1938).

Figure 1

Operant Conditioning Term Matrix



Note. Diagram explaining the four basic terms of operant conditioning: "positive," "negative," "reinforcement," and "punishment." From Blackwell et al., 2012.

Considerations When Training

Hosey et al. (2013) presented a basic framework for how to train a behavior in an animal using shaping, successive approximation, and positive reinforcement. After the trainer has decided what behavior they want to teach the animal and has developed a shaping plan for how to achieve the behavior, the first step is to capture and reinforce the first approximation of the behavior when it occurs (Hosey et al., 2013). Skinner (1981) observed that behavior is subject to variation and selection. Therefore, as the original behavior that was reinforced in the animal continues to occur, it will occur differently and vary in some aspect each time. This is where the trainer must begin to shape the behavior by only reinforcing the variations that lead to the desired end behavior (Hosey et al., 2013). Thus, the behavior is shaped and its successive

approximations toward the final behavior are repeatedly reinforced until the final behavior is exhibited (Pryor, 1984).

This process of training new behaviors in animals has become quite popular. Hosey et al. (2013) mentioned that positive reinforcement training has the potential, if the trainer sets the animal up for success, to almost eliminate the need to punish the animal for the incorrect behavior as the animal seeks reinforcement for the correct behavior. Pryor (1984) cautioned widely against using punishment as a means of discouraging a behavior, stating that it is often unsuccessful, teaches the animal nothing, especially when used frequently, and is hard for the animal to temporally connect the punishment with their behavior unless the punishment is received nearly instantaneously. Kleiman et al. (2010) also wrote that punishment can be destructive regarding the relationship between the keeper and their animal, possibly producing aggression towards the keeper by the animal. In fact, using positive reinforcement over punishment often results in a stronger relationship between the keeper and the animal, providing an environment for building trust (Kleiman et al., 2010; Pryor, 1984).

Another nuance to consider when training an animal is how often the behaviors should be reinforced. Different behaviors can be on different schedules of reinforcement, which could include continuous reinforcement, fixed or variable ratio, and fixed or variable interval. Pryor (1984) suggested using a continuous schedule of reinforcement when the animal is just learning the behavior, which simply means that the animal is reinforced or rewarded every time it performs the behavior. If an animal is reinforced on a ratio schedule, it is reinforced for every n^{th} correct response, and if this ratio is fixed then n is a set number (Kleiman et al., 2010). For example, a dolphin could be rewarded for every second correct response. If the ratio is variable, then the dolphin could be rewarded on its second correct response, then on its fourth, then its

first, and so on, but there is a set average number of responses that it takes to earn the reinforcement (Domjan & Grau, 2015; Kleiman et al., 2015). Fixed and variable interval schedules of reinforcement work the same way, but rather than waiting for a correct number of responses the animal is rewarded after a certain length of time (Kleiman et al., 2010). Pryor (1984) suggested reinforcing the animal after it has learned the behavior by using a variable-ratio schedule of reinforcement, as did Kleiman et al. (2010). Kleiman et al. (2010) stated that animals tend to learn faster with this schedule as well as maintain the behavior for longer periods of time while being less susceptible to extinction.

Training also depends greatly upon the individual animal, as well as the species (Hosey et al., 2013). Certain individuals are more likely to learn or will have an easier time learning something than another individual of the same species, whether that is due to neurophysiological reasons or simply because that individual has differing life experiences that affect its reactions and behaviors in the training scenario (Fagen et al., 2014; Keliman et al., 2010).

An animal's sensory world also affects what stimuli it can respond to, and should be considered in many instances, such as when choosing what to use as a secondary reinforcer or how to cue the animal (Kleiman et al., 2010). For example, using an audible secondary reinforcer for a deaf dog or using small and subtle visual cues with an animal that cannot see very well would not be effective. The choice of primary reinforcers could also depend upon the animal's unique personality. Often, trainers use food as a primary reinforcer, but toys or simply attention from and time spent with the keeper are common as well (Hosey et al., 2013). Interestingly, Kleiman et al. (2010) mentioned a group of rhinos that enjoyed belly scratches as their primary reinforcer.

Finally, an animal's natural history affects its ability to learn certain tasks (Kleiman et al., 2010). Animals have species-specific behaviors in their natural environment that aid them in survival, and training a behavior that is contrary to these behaviors can be difficult. Kleiman et al. (2010) discussed the scenario of training a gazelle to enter a crate and describe the gazelle as being "contraprepared" to learn this behavior because its instincts tell it to flee rather than trap itself in a small, enclosed space. For training to be most effective, it is key that animal keepers know the animal that they are working with, including knowing what items or actions are appetitive or aversive to the animal, when the animal learns best, and how the animal acts when it is under stress or uncomfortable in the situation (Kleiman et al., 2010). Animal keepers and trainers must bear all these things in mind when creating a training plan for the animals in their care.

Clicker Training

One way that Skinner's Theory of Operant Conditioning has been applied to animal training is through what is known as clicker training. Clicker training is the main topic of Karen Pryor's *Don't Shoot the Dog! The New Art of Teaching and Training* published in 1984, as well as her book published in 2009 entitled *Reaching the Animal Mind: Clicker Training and What it Teaches Us About All Animals*. These books have gained wide popularity in both the amateur and professional world as Pryor has become known as one of the forerunners and professionals in this training technology, and has found much success in it (Pryor, 1984; Pryor, 2009).

A clicker is a small plastic object with a button that, when depressed, makes a clicking noise. The clicker is originally a neutral stimulus to the animal, but after repeated pairings with a primary reinforcer the clicker gains appetitive value to the animal (Pryor, 1984; Pryor, 2009). During training sessions, the clicker alerts the animal at the precise moment when it performs the

correct behavior, and as discussed above, the click may be followed by a primary reinforcer such as food depending on which schedule of reinforcement is in effect (Feng et al., 2016; Pryor, 1984; Pryor, 2009). It should be noted, however, that the device need not necessarily be a clicker. One could use a whistle, a flash of light such as what Skinner used with the dalmatian, or even a chosen word or phrase such as "good." Many claim that using a clicker in training helps increase learning rates and makes learning easier, to be further discussed later.

There are three different theories as to how the clicker facilitates learning. The first theory is the Reinforcing Hypothesis wherein the clicker itself becomes reinforcing to the animal after repeated pairings with a primary reinforcer (Feng et al., 2016). In contrast, the Marking Hypothesis describes how the clicker, if used correctly, alerts the animal the moment that it is doing what the trainer desires, and therefore serves as a method of communication (Feng et al., 2016). Finally, the Bridging Hypothesis states that the click serves to prevent the delay of reinforcement when an animal performs the correct behavior (Feng et al., 2016). For example, without the click, one must cue the animal for the behavior and then wait until after the behavior is accomplished and the animal returns to them to receive their reward, hoping that the animal knew for what it was being rewarded. But with the click, the space of time between the behavior and the reward is filled, so theoretically the behavior is connected to the reward. Feng and co-authors (2016) concluded that the Reinforcing Hypothesis seems to have the most validity, while the Marking and Bridging Hypotheses are complements to the Reinforcing Hypothesis. Pryor (2009) discussed each of these ideas and seemed to believe that each plays a role in how the animal learns and responds to the clicker.

Efficacy and Benefits of Positive Reinforcement Training

Studies vary as to the efficacy of positive reinforcement and clicker training methods. Often, animals in captivity must be captured and/or handled for medical or basic husbandry procedures, which can stress the animals (Kleiman et al., 2010). However, the use of positive reinforcement training to teach animals to move to certain areas or present certain body parts can minimize these physical stressors (Kleiman et al., 2010). In fact, Reinhardt (2003) found that in rhesus macaques, blood cortisol levels were significantly lower in macaques that had been trained for offering their arms for blood draws than in macaques who were restrained using the standard methods, indicating lower stress levels and greater welfare for the macaques that had undergone training. These training procedures may also be used to teach behaviors that aid in conducting research, the results of which could further deepen the knowledge used to care for and maintain those same animals (Kleiman et al., 2010). Spiezio et al. (2017) discussed numerous additional benefits of positive reinforcement training, including increased welfare for the animals due to the challenge and mental stimulation provided by the training; improved interactions between animal and human; a promotion of species-typical behaviors; and the ability to choose, which allows a level of control over the environment and therefore affects the animal's ability to cope with new or stressful stimuli. Additionally, Hosey et al. (2013) discussed the possibility of using positive reinforcement training to train self-injurious and negative stereotypical behaviors out of animals in captivity. All of these benefits culminate into a greater physical and psychological well-being for the captive animal (Spiezio et al., 2017).

However, Hosey et al. (2013) cautioned against creating a "mental barrier" as a result of training. This results when an animal is taught to perform a specific behavior in place of one it would perform more naturally, but either the animal's motivation to perform the original

behavior remains unchanged or the environmental stimuli that prompt the original behavior still exist and the animal becomes confused or frustrated about what action to take (Hosey et al., 2013). Again, however, the individual personality and the unique situation of the trainer, the animal, and the environment all play a role in this and must be carefully considered (Fagen et al., 2014; Hosey et al., 2010; Kleiman et al., 2010; Melfi & Thomas, 2005).

In more specific studies, utilization of positive reinforcement training has produced mixed results. Paredes-Ramos et al. (2020) trained twenty Yucatan mini pigs to fetch, and found that pigs trained using clicker training, wherein the words "very good" served as the clicker, did learn the complex behaviors in less repetitions. Thus, clicker training facilitated learning (Paredes-Ramos et al., 2020). However, in discriminatory trials, the clicker trained pigs showed a reduced ability to make the right choice as the animals seemed to neglect trying new strategies in solving new problems (Paredes-Ramos et al., 2020). The authors speculated that the reason for this may derive from the similarity between the discriminatory trials and the context of the original training, which could have caused the animals to confuse what was being asked of them (Paredes-Ramos et al., 2020). However, Pryor (1984; 2009) described with various examples how an animal can be trained to be more creative, suggesting that one might be able to train problem solving into animals and thus combat the negative effects that Paredes-Ramos et al. (2020) discovered.

A group of Abyssinian colobus monkeys presented another example of potential negative effects of these training methods. The monkeys began to seek human interaction less from their keepers, other zoo staff, and from the facility's visitors after undergoing positive reinforcement training to present their mouths for oral examinations, until after three months of training the monkeys were not observed to interact with the visitors at all (Melfi & Thomas, 2005). However,

no other aspects of the monkeys' behavior were affected (Melfi & Thomas, 2005). Melfi and Thomas (2005) postulated two reasons to explain these unexpected results: first, the training sessions were predictable in that if the monkey did what was asked then it received rewards, something that did not happen in any other human interaction; second, the positive interactions between the keepers and the monkeys allowed them to habituate to other human activity around them and therefore acted as a type of socialization. The authors concluded that the training was beneficial overall because the decreased human interactions meant that the animals were habituated and experiencing less stress, and the training itself allowed various medical procedures to take place (Melfi & Thomas, 2005).

Some researchers have claimed that positive reinforcement training methods may count as enrichment for captive animals. Dorey and co-authors (2015) tested whether four male wolves (two arctic wolves and two gray wolves) preferred training behaviors or environmental enrichment by exposing the wolves to each separately and then pairing the two and allowing the wolves to choose between them. Only one of the four wolves exhibited a significant preference for enrichment over training (Dorey et al., 2015). Here again, the difference may lie in individual preferences of the animals (Dorey et al., 2015). However, these findings are valuable because some of the animals are repeatedly choosing to engage in positive reinforcement training methods over environmental enrichment, indicating some level of stimulation which could be beneficial for the animals in terms of their welfare in captivity. While the study by Dorey and co-authors (2015) did not conclusively indicate that positive reinforcement training counts as enrichment, the data indicated that it is a possibility and emphasized the need for future research.

Fernandez et al. (2019) also conducted a study involving enrichment and positive reinforcement training, but they had a different objective. Captive penguins can develop medical

issues and a sedentary lifestyle because they spend much less time in the water than their wild counterparts (Fernandez et al., 2019). Thus, the authors' goal was to use training to increase captive Magellanic penguins' and southern rockhopper penguins' interactions with enrichment items in the water, which would in turn increase their swimming time (Fernandez et al., 2019). The results of the study showed a great benefit to the southern rockhopper penguins as their swim time significantly increased even after training ended, and they also exhibited a species-typical porpoising behavior more often (Fernandez et al., 2019). This increase in a species-typical behavior indicates the positive effect of enrichment on the animals' welfare (Fernandez et al., 2019). However, the results differed for the Magellanic penguins as they began to avoid the pool after training (Fernandez et al., 2019). This is important to note because in mixed-species exhibits, enrichment may not affect both species the same way (Fernandez et al., 2019). Perhaps the Magellanic penguins were simply trying to avoid the rockhoppers, or it is possible that they did not respond to training the same way that the rockhoppers did. Thus, this is a great example of how individuals and different species may respond differently to training procedures and why it is so important to consider these nuances when creating a training plan.

Finally, Spiezio et al. (2017) conducted a study on ring-tailed lemurs to learn how their welfare was affected after using positive reinforcement training methods to teach these highly social creatures to temporarily isolate themselves for husbandry and medical procedures. Interestingly, following training the lemurs displayed fewer agonistic behaviors than in the baseline period while also displaying a greater number of social, affiliative behaviors, such as grooming and play (Spiezio et al., 2017). Additionally, the authors noted that captive animals tend to relocate to areas in their enclosure that are out of human sight to avoid stress (Spiezio et al., 2017). However, after training the lemurs were in human sight for a greater amount of time

(Spiezio et al., 2017). Finally, the lemurs' locomotion decreased after their training, indicating lower stress levels (Spiezio et al., 2017). Thus, the authors observed an increased number of beneficial behaviors in the lemurs as a result of training, from better social interactions to lower stress levels, all indicating that their welfare may have improved after being trained for temporary isolation using positive reinforcement (Spiezio et al., 2017).

What Animals Can Learn

With the use of positive reinforcement training methods, animal trainers have accomplished teaching a variety of previously unheard of behaviors in a myriad of animal species. The behaviors that are trained are not just for fun, but many of them are invaluable as daily husbandry and medical procedures for the animals, and in enabling their keepers to improve the quality of care given to the animals while also increasing the depth of knowledge regarding each animal species and each individual.

Examples abound from around the world of revolutionary behaviors that have been trained through positive reinforcement alone. In Nepal, trainers taught elephants to take saline into their trunks, lift their trunks to wash the saline to its base, and then blow the fluid into a collection container so that the keepers can collect a sputum sample to test for tuberculosis (Fagen et al., 2014). Neto et al. (2016) trained bottlenose dolphins to interact with enrichment devices to improve welfare, and encourage play and the development of social affiliations, predation behaviors, and motor and visual coordination. Not only did the dolphins that were part of the study continue to interact with their enrichment toys in the absence of trainers and rewards, but dolphins that were in the same pools but were not involved in the study also showed increased interest in the toys (Neto et al., 2016). Otaki et al. (2015) trained two Andean bears and two Asiatic black bears a blood draw behavior wherein the bears had to reach their palms and

carpal joints through the fence in their enclosure and hold onto bamboo pipes outside of their fence while their paws were palpated and then injected. Dadone et al. (2016) taught reticulated giraffes to present their front feet for radiographs and hoof trims. Following training, the number of giraffes with overgrown hooves significantly decreased, the giraffes showed less apprehension towards novel and aversive stimuli, keeper-animal relations improved, opportunities increased surrounding the study of giraffe foot epidemiology, fewer anesthetic procedures were required so risks for anesthetic mortalities and in turn negative publicity were reduced, time and money were saved due to the efficiency of the process, and zoo guests' experiences were enhanced which could have a positive effect on the reception of the public to messages regarding wildlife conservation (Dadone et al., 2016). Hosey et al. (2013) discussed giant pandas which have been trained various parenting skills and to move around their enclosure; aldabra tortoises trained for voluntary blood draws; a plethora of reptiles that have been trained for numerous veterinary procedures; and Asian rhinoceroses and gorillas that have been trained to facilitate artificial insemination.

Pryor (1984) even discussed a domestic cat wherein novel, unusual, or unique behaviors were reinforced to the point that the cat was considered creative in its behaviors. Essentially, creativity was reinforced. Goddard (2021) also discussed this idea of reinforcing creativity when she described creative innovations as repetitively building upon previous steps or ideas, and she compared this description to Skinner's definition of shaping and successive approximation, or building upon the behavior that came previously. Further, these ideas have been proven to be successful to some degree in games such as *101 Things to Do with a Box* and *Show Me Something New* (Pryor, 1984; Pryor, 2009). In *101 Things to Do with a Box*, the animal is reinforced for performing a new action surrounding a simple cardboard box (Pryor, 1984; Pryor,

2009). For example, a dog could put its paw in the box, then sit in the box, then pick up the box, etc. In *Show Me Something New*, which Pryor (1984; 2009) discussed as usually being played by keepers and their gorillas, the gorilla must create a new action to earn its reward. In some stories, the gorillas were simply making "funny" facial expressions at their keepers (Pryor, 1984; Pryor, 2009). For each of these games, the animal is not reinforced for repeating a behavior it has already done (Pryor, 1984; Pryor, 2009). Thus, these games serve to get the animal's mind engaged and thinking, and they can teach the keepers a lot about the animal that they are working with, as Pryor (2009) strongly emphasized.

Trainers have learned to communicate with and teach many different animal species beyond just the above mentioned. From primates to pinnipeds, crocodiles to cetaceans, and even small fish and hermit crabs, positive reinforcement training is invaluable in helping cross the communication barrier between human and animal, and in increasing the behavioral repertoire of animals in captivity that helps with daily husbandry and medical procedures (Hosey et al., 2013; Pryor, 1984; Pryor, 2009).

Literature Gap

Despite all of this knowledge gained involving the benefits and positive effects of utilizing positive reinforcement training methods in zoos, wildlife rehabilitation centers, and other captive animal settings, there have been no publications to this authors' knowledge detailing whether these ideas are being used in a widespread manner throughout the United States, or if the articles are merely case studies and isolated incidents. Additionally, it is unclear if these methods are being used to their full potential, or if many zookeepers today are unaware of them or have too many questions regarding their use to implement them into their daily routines. Lack of such publications prompts the question: do zoos and wildlife rehabilitation

centers currently have animal behavior and training programs? If so, what do these programs entail, and what training methods are keepers using? Thus, the purpose of this study is to determine what behavior and training methods and programs zoos and wildlife rehabilitation centers currently have implemented in the Eastern United States, and what keepers may be using animal training to accomplish. Another objective is to discern what captive animals' keepers may be questioning regarding positive reinforcement training methods specifically and how they are implemented. Understanding this could prompt further research into how these training methods may be of more value, or how they could more easily be implemented in captive animal settings. To accomplish these research objectives, the author conducted interviews over the phone with animal keepers from various zoos and wildlife rehabilitation centers in the eastern United States and asked a predetermined set of questions to each animal keeper.

Methods

The author decided that the best way to ascertain the current condition of animal behavior and training programs in animal care facilities in the United States was to conduct interviews with animal keepers that participate in said programs. One-on-one interviews conducted for this qualitative study were necessary to provide flexibility and to obtain as much information as possible. Open-ended questions allowed the interviewees to respond in depth and provide richer information than a more structured survey. Additionally, because this approach was flexible, the researcher could respond to any answers given and ask further directed, probing questions regarding new themes and subjects that the interviewee discussed.

With hundreds of zoos in the United States, the scope of the project and the sample size had to be narrowed, so the author decided to contact zoos in states east of the Mississippi River. First, the author obtained Institutional Animal Care and Use Committee (IACUC) approval from

Liberty University. Then, she contacted zoos and wildlife rehabilitation centers by email with a brief description of the study and its goals as well as an attached consent form that, if the animal keepers wished, they could sign and return to the researcher to confirm their participation in the study. If the author could not locate a zoo's email address on their website, she contacted the facility by telephone and inquired about an email to which she could send the aforementioned information. After the recruitment email and consent document were sent, if the zoos did not respond within two weeks, the author sent a follow-up email asking to either confirm or deny participation.

Once the author was in contact with animal keepers from various facilities, she scheduled a date and time to conduct an over-the-phone interview wherein she asked the keeper a pre-determined list of questions. Due to the protocols of one facility, the animal trainers were unable to set up a phone interview, so instead they answered the interview questions via email. Six total interviews were conducted. The researcher combined and reviewed the data from these interviews qualitatively to compare and contrast the different training and behavior programs, and also to determine where uncertainty lies surrounding the training programs in order to ascertain future areas of research.

Results

Overall, the researcher contacted 25 zoos and wildlife rehabilitation centers and six trainers agreed to participate in the phone interviews. The interviews lasted between 30 minutes to an hour. The following details the questions and subsequent responses in each of the interviews.

Does your facility have a set training program in place? Please explain.

The facilities that employ each of the trainers interviewed are arranged on a spectrum from less to greater structure and organization in the training programs that are implemented, and one program is relatively new in that the trainer recently switched from utilizing traditional falconry training methods to methods based on positive reinforcement. In most of the programs, trainers first decide when and what behaviors are to be trained, and then they draw up a shaping plan which needs approval by the supervisor or curator and sometimes the animals' veterinarian. The shaping plans may contain specific stipulations as to how they can be adjusted based upon the animals' rate of learning or reactions to the methods, but other facilities use the plans as more of a loose guide in creating the desired behaviors. Most of the trainers must keep written records of their training progress. Many of the keepers discussed the necessity of being able to adapt to each animal and keep their pace to get the best rate of learning. Most of the chosen behaviors to train are based upon behaviors that enable better care of and welfare for the animals, but if there is extra time or the animal has accomplished all that the trainer is currently working on, some additional "fun" behaviors may be added to the repertoire. Overall, time and resources are very large factors in what each trainer is able to teach their animals. These program elements apply to almost every facility at which a trainer was interviewed, but the facilities differ in whether the programs are based upon Primary Animals or Primary Behaviors. Under a Primary Animal program, each keeper is in charge of their specific animals and they train all of the new behaviors for those animals. Under a Primary Behavior program, each trainer is in charge of teaching specific behaviors to a variety of animals, so that each animal has many different trainers. One trainer stated that working under a Primary Behavior program made it more difficult to form relationships with the animal because they might not be working with that animal for a number

of weeks. However, Primary Behavior programs do allow the animals to be comfortable working with a larger group of people, and it teaches them how to think differently since they are being taught by different people with different teaching styles. This variability prevents complete predictability so that the animals are actually working to learn, but as one keeper emphasized, when the teams of trainers are small the animal is still able to understand what is expected of it.

Operant conditioning and positive reinforcement training methods are the primary methods used at all facilities. Some trainers acknowledged the importance of classical conditioning to accomplish their training while other trainers admitted that they were sometimes using negative reinforcement and positive punishment without realizing it. The trainer at one facility specifically stated that negative reinforcement and negative punishment are occasionally used, but "only when absolutely necessary." Two trainers stated that using a time-out from training was an effective means of communicating that the animal was doing something undesirable. The trainers at each of the facilities place an emphasis on giving the animals the choice to participate in training and using primary reinforcers that are appetitive to each individual animal. Most of the keepers use food from the animals' daily diets as their primary reinforcers, which are adjusted and made more appetitive when the trainers ask for more difficult behaviors. Some of the animals prefer tactile stimulation, such as the pigs (who specifically prefer belly scratches), sea lions, and elephants. One trainer discussed a puffin which would not feed from the trainer's hand, so its primary reinforcer was playing with toys. Another puffin and a male polar bear prefer reinforcement through human attention and interaction, while a harbor seal, a falcon, and different reptiles are given access to different locations or shelters in their enclosures. Finally, one trainer discussed using play time and time with conspecifics as attractive reinforcers for certain animals.

The facilities also differ on the mechanism used as a secondary reinforcer. Most use a combination of clickers and verbal secondary reinforcers such as “good,” while others also incorporate a whistle, some verbal sound or, as in the case of the sea lions at one facility, the secondary reinforcer is the trainer pointing at them. Again, the choice of the specific secondary reinforcer depends on the individual animal, as one trainer explained that the silverback gorillas prefer verbal secondary reinforcers while blackback gorillas prefer and learn more rapidly with a clicker. One trainer mentioned that secondary reinforcers are sometimes not used at all for certain animals.

What species of animals do you train?

The keepers interviewed train a wide variety of animals, including silverback gorillas, blackback gorillas, baboons, grizzly bears, black bears, polar bears, horn puffins, North American porcupines, Indian crested porcupines, Asian small-clawed otters, harbor seals, sea lions, arctic foxes, raptors, opossums, goats, tufted deer, red wolves, tortoises, snow leopards, stingrays, rhinos, and a number of pig species.

What behaviors do you train your animals?

The trainers overwhelmingly responded to this question with the importance of the “target” behavior. This behavior involves the animal touching a specific body part, usually their nose, to a specified object. In the case of the grizzly bear, it has been trained to touch its nose to a red buoy. “Target” is so important because it enables the trainers to position the animals in ways that allow for the training of more complicated behaviors, and it also creates an easy pathway for teaching the animals to stand on a weight scale, perch on a glove, or get in a crate. For example, without training the porcupine to voluntarily enter her crate, trainers would normally have to push her into the crate with a board. But the porcupine’s trained “crate” behavior significantly

decreases the stress that the process would otherwise involve. Other foundational behaviors include the presentation of each animal's body parts, such as their hands, feet, chest, back, and open mouth, for visual inspections. Otters are taught to "rest" and stop vocalizing for visual health inspections, which is a behavior quite contrary to their usual behavior. An especially important behavior for protected-contact animals involves training them to shift from one part of their enclosure to another. After these simpler behaviors are mastered, trainers move on to teach other behaviors varying in complexity which make the animals' care easier and safer by decreasing their stress. These include a "come," "remote station" where the animal stays in one spot away from the trainer, and entering and behaving inside of a kennel or cage. To help during feeding time, some trainers assign each pig a colored mat which they must stand on while they are eating to prevent them from stealing another pig's food. Finally, trainers teach certain other behaviors to demonstrate different species' natural abilities to guests, to encourage the animals to be more comfortable around guests and human presence, and to provide enrichment to the animals that need high amounts of psychological stimulation, such as the otters.

Behaviors even greater in complexity are later added to the repertoire. In the case of the gorillas, such behaviors could include voluntary blood draws, blood pressure readings, EKGs, and echocardiograms. These behaviors are quite beneficial and important because cardiovascular disease is the leading cause of death in great apes in captivity according to one trainer interviewed, and being able to perform these measures of health without having to anesthetize the animal or put it under more stress is a very positive indicator for its welfare. The same principles are applied to the training and care of the grizzly bears, which also undergo voluntary blood draws as well as a "lean in" behavior where they present their side for vaccinations. The harbor seals know to put their face into anesthesia masks and have been taught 40-50 different

behaviors. Trainers taught foxes, which they explained do not like to be touched, to allow topical application of their flea/tick preventatives. The pigs are trained to allow injections, but the trainer stated that this training is more of a basic classical conditioning procedure than it is operant conditioning. To perform this procedure, trainers hang a plate with peanut butter on the wall and while the pig is distracted by eating the peanut butter, the staff administers its injections. The trainer explained that the objective with this is not so much training a behavior, but rather getting the animal used to the procedure.

Additionally, one trainer taught an ape to target to lasers so that the trainer could move the laser around its enclosure and allow the public to see how they climb and move. Along these same lines, a trainer taught natural behaviors to a grizzly bear, such as digging, to teach the public more about their natural history. One trainer halter-trained a goat so that it could be led around the zoo and interact with the public. However, the gorilla trainer stated specifically that they avoid training anthropomorphic behaviors as much as possible so as to prevent the public from seeing such behaviors and believing that the captive zoo animals would make good pets. Even so, one of their chimps does a fist bump, which allows it to connect to guests and engage the public.

What steps do you take in training a new behavior?

To train a new behavior, the first step is always planning. Trainers must determine what behavior they want to teach, why it is valuable, how they can safely teach it, and what equipment they need or if they need to make modifications to the enclosure. Then they create a training or shaping plan which involves very small steps and approximations towards the end goal. However, it is also possible to plan training which involves capturing the end behavior, or capturing a successive approximation and continuing training from that point. One trainer

practices this quite frequently, often using food to lure the animals to the location the trainer wants and then marking and rewarding the animal when it does what the trainer is seeking. During training sessions, the trainers are usually required to document their progress and how they may have deviated from their plan due to the different learning abilities or styles of each animal. If the animal is new, one trainer described first feeding and rewarding them for making eye contact and then spending time with the trainers to encourage relationship building. Also during this time, another trainer discussed the need for establishing the connection between the primary and secondary reinforcers through classical conditioning.

One trainer gave a more in-depth explanation of how the grizzly bears are trained for voluntary blood draws. To conduct the blood draw, there is a sleeve that the bear must put its arm through so that it can be manipulated by the staff outside of its enclosure. Trainers will put food inside the sleeve to lure the bear to it, and when he puts his paw in the sleeve that behavior is marked and captured. This initial behavior is built upon to the point that the bear puts its paw in the sleeve, leaves it there, and allows his paw to be palpated by the vet staff to locate a vein and draw blood. This behavior takes between three and six months to train, and because of its complexity, the trainer emphasized being able to adapt and be open to training things in different ways if the animal is having trouble comprehending it.

To further illustrate this point of the necessity of being flexible during a training session, the same trainer discussed two sea lions and how one was always wanting to try new behaviors, whereas the other wanted to be told exactly what to do. As a result, training these two individuals the same behavior could vary considerably in how the learning progressed. Another trainer touched on this point as well when they described a black vulture that sometimes needed to take breaks during training sessions. If he was struggling to grasp a new concept, the trainer would

take a step back and ask for simpler behaviors with which the vulture was quite familiar. This essentially gave him a break while also boosting his confidence, helping him to later achieve whatever the trainer was trying to teach him.

In your opinion, has training using these methods improved keeper-animal relationships?

The answer to this question was a unanimous "yes" from all trainers in the study. One trainer elaborated by explaining that conducting training sessions with the animals assigns a positive association to the trainer. This same trainer also explained that they do not always do training sessions where the animal is learning a new behavior, but sometimes the trainer will ask for only simple behaviors to reinforce so that the animal is being rewarded, having fun, and building trust with its trainer. This relationship and trust in the trainer by the animal are essential because it means that, especially when a situation occurs which could induce panic, the animal will look towards and rely on the trainer for guidance.

At the facility which switched from traditional falconry training to methods of positive reinforcement, the trainer has noticed an obvious improvement in their relationship with the birds. The trainer stated that allowing the animals to choose whether they want to participate in training that day has significantly reduced their stress. Additionally, the raptors actually exhibit behaviors of excitement when the trainer approaches, compared to the defensive and avoidance behaviors they exhibit when approached by medical staff who do not give the birds a choice on whether they want to participate.

Another trainer emphasized the greater trust levels, but also highlighted another important aspect of the trainer-animal relationship. They said that every interaction with the animal is a training session, and how one conducts themselves all of the time also affects the levels of trust built and the expectations that the trainer and animal have for each other. For

example, the trainer described a scenario where an animal is displaying aggression during feeding time. Continuing to feed the animal is reinforcing the aggressive behavior, but ending the feeding and coming back later would be a simple act that can teach the animal what the trainer expects from it.

Have there been any negative effects of using positive reinforcement training with your animals?

None of the trainers surveyed have seen any negative effects of the use of positive reinforcement training methods on their animals. However, one trainer did discuss some of the animals becoming frustrated during training, but this frustration only developed if a trainer was timing their reinforcers incorrectly. They also mentioned animals competing for attention from the trainer, but again, this is a problem with a simple solution. All of the keepers emphasized that their animals always have a choice on whether they want to participate in the training, which has a significant positive effect on their welfare and the outcome of the training in general.

What has this training program taught you about your animals?

All of the trainers emphasized the need to adapt and adjust the training so that it is specific to each individual animal. Each animal, even individuals amongst the same species, learns at different rates, and there is not one specific "right" way to do something. So trainers must be flexible and patient, allowing the animal to choose the direction of each training session while the trainer guides it. One trainer specifically discussed that the animals must be respected. For example, they cited an American kestrel that, if it does not want to train that day, will scream when the trainer enters the enclosure and turn his head to prevent seeing the trainer. The trainer has to respect their choice to not participate, which encourages the bird to respect the trainer when they are asking it to perform certain behaviors.

Some trainers were more specific in their responses. One discussed a male sea lion that was always very excited and energetic, and if he did a behavior correctly, he would "vocalize as if he were his own cheerleader." Another trainer discussed a male polar bear which was able to make generalizations fairly quickly. For example, if he was trained to present his right shoulder, he would very easily understand the trainer when asked to present his left shoulder. This trainer emphasized learning how each of the animals' brains work to train them in the best manner, stating that the polar bear is "really book smart but common sense is lacking." In another instance, a trainer described a female fox which the trainer claimed is always "four shaping plans and 20 steps ahead of you" because the fox is so intelligent. However, this fox is less likely to approach a novel situation than her male counterpart, so the trainer uses the male fox's curiosity to encourage the female fox to approach. The trainer stated that learning and using these personality quirks to their advantage has often been quite helpful. Finally, a trainer discussed the importance of being open to trying different things with different animals, even if one does not expect the result to turn out perfectly. For example, this trainer works with Tennessee feinting goats, a species that the trainer stated usually is not very fond of people. The trainer randomly decided one day to sit next to a goat in its enclosure and to pet her. Surprisingly, the goat showed clear enjoyment of this tactile reinforcement, and now the goat is trained to walk wearing a halter and shows signs of excitement when she sees the trainer with the halter. Trying something new and unexpected allowed this trainer to make a wonderful breakthrough.

When faced with a challenging animal, how did you overcome it?

The trainers each described various challenges they faced with different species of animals, but each emphasized the importance of patience, building trust, and rethinking the training plan if it is not working. One trainer discussed the importance of observing the animal's

behavior to understand why it is having trouble. Another trainer discussed a silverback gorilla that did not like to do voluntary blood pressure readings, and to solve the problem the trainer had to think about ways that the gorilla could be made more comfortable. Additionally, this trainer explained the importance of using a primary reinforcer that has a very high value when asking for novel or difficult behaviors. With the gorillas, pineapple chunks are examples of high-value rewards because they are not fed every day, whereas grapes and apples are more commonplace.

Another trainer described having challenges when teaching a sea lion a voluntary blood draw behavior. To accomplish this, the sea lion must be lying down on its stomach and it must allow the staff to palpate along its vertebrae where the injection will occur. The trainer was having difficulty completing some of the steps, and so the trainer asked for help from a secondary trainer who had previously successfully trained the full behavior. From this experience, the trainer recognized the importance of asking for help from those that are more knowledgeable and of working with people who have different strengths and experiences. A second trainer also discussed the importance of reaching out to colleagues for help and advice.

Hawks, puffins, seals, and foxes have all created some challenges for a different trainer. This trainer discussed a hawk that was supposed to be trained as an educational program bird, but it was constantly attempting to attack people. To effectively train this bird, the trainer had to teach it two new behaviors simultaneously to keep it occupied because it was so intelligent. Additionally, the trainer had to be creative in how they set up for the behavior so that the only consistency was the cue for the behavior. This showed the trainer that they must be precise in their actions so that the trainer and animal both understand the same action or verbal phrase is the cue for a behavior, rather than some other actions that occur before the cue of which the trainer is unaware. The puffin provided a challenge in that it took six months to teach it to

"station," or to stand and remain at a specific location. But working to understand its behavior and motivation was helpful to the trainer, as after this it took almost no time to teach the puffin to step up onto a perch. The seal provided a challenge in that he eventually did not want to interact with the trainers or listen to their cues. This occurred during the winter when the seal was at his heaviest weight, and the trainers were asking him to enter a tight holding space where he was uncomfortable. Additionally, the trainer explained that the seal's trainers' attitudes were not very positive. To overcome this challenge, the trainers had to first be more positive and high-energy in the training sessions, and then they had to implement behaviors that were mentally stimulating and fun to engage the seal. When they got to the point where he would go into his holding area, he was allowed to leave almost immediately and was not asked to go into that area again until he had two more training sessions that were only focused on having fun. Finally, the foxes have been challenging because they are not always willing to participate in training sessions like most of the other animals. To encourage participation, the trainer will reinforce the foxes for just approaching the trainer and for doing simple behaviors to remind them that the trainer is associated with positive rewards.

Another trainer discussed challenges in training a group of otters. The behavior they wanted to train involved the otters staying at one location and not moving while the trainer moved out of sight. This would have enabled the trainer to shift one otter out of the enclosure while leaving the rest of the group in it. However, the otters would rapidly lose focus and were never able to achieve success with this behavior. The trainer realized that some animals are simply not wired to perform certain behaviors, and one must be cognizant of that when they are asking the animal for a new behavior. Additionally, the trainer stated that this behavior was not a high priority, so it did not matter if they decided to forgo it to pursue others.

Finally, the last trainer related their challenges mostly to being less experienced and not having help. At their facility, this trainer is the only active animal trainer and therefore, when the trainer runs into challenges or problems, they have no one with whom they can discuss the issue or get help. Specific challenges involved the birds overcoming their fears associated with falconry training, something that the trainer discussed may just take time.

Do you believe the current training program is the best option for what you are trying to accomplish? If not, what would you like to change?

While they admitted that there is always room to learn, each of the trainers stated that they thought their training programs were working out quite well and they are able to accomplish much of what they set out to do. One trainer specifically stated that they are not aware of any training methods which are more successful than those based on positive reinforcement. Major limiting factors in what a training program is able to accomplish involve the time, money, and resources available. One trainer explained how having more time would allow them to actively review what they are currently working on and engage with other staff more directly so that their current goals can be further examined and developed. It would also enable further staff development and encourage their alignment with the most up to date information on animal learning. Another trainer stated that in their program, they are only allowed to train one animal three behaviors at a time, which limits what and when they can train a behavior that may prove to be quite beneficial. A different trainer said that it would be helpful if crates and scales were located in each animal enclosure and specific to each species, rather than having to move things around all of the time; but purchasing these could be quite costly. One trainer related part of the success of their program to their coordination with their vet staff and understanding of which behaviors would be most beneficial for enabling easier animal care. Additionally, a trainer

mentioned that their training program has a Training Resource Team which is constantly reading and analyzing new behavioral learning theories and their applications to ensure that their trainers have the most up to date information possible.

At one facility, a trainer discussed the successes that they have had with positive reinforcement training compared to traditional falconry methods and why they believe positive reinforcement methods are the best for their facility. This trainer described how, under traditional falconry training, a great horned owl was captured, fitted with jesses, and made to sit on a fist for hours. The bird was given no choice in the training and following this experience it has had great difficulty adjusting to human presence at all. Now, the trainer is implementing methods of positive reinforcement and allowing the animals a choice in their participation. However, this great horned owl still panics whenever the trainer makes eye contact with her, evidence that she still has a long way to go. Experiences such as this pushed the trainer to implement positive reinforcement training with the facility's animals to improve welfare and husbandry practices and minimize stress as much as possible.

What would you like to be able to train or accomplish that you are not currently working on?

Each of the keepers had some interesting ideas on new behaviors to train that would make their animals' care much easier. One trainer cited the chimpanzees and orangutans at their zoo which have been trained to allow their teeth to be brushed, and they said that they would like to incorporate this with their gorillas. However, there are a lot of safety considerations to be addressed before they can implement such a behavior. Another trainer discussed wanting to train their foxes for more medical behaviors because currently the foxes must be captured and handled for everything, which is quite stressful. These include behaviors such as allowing hip injections

to combat worms and parasites and accepting oral medications. The trainer wants to teach oral medication acceptance to the bears and porcupines, as well. Other behaviors that the trainers would like to teach involve training pigs to voluntarily enter their crates and otters to open their mouths for visual exams. A different trainer expressed a desire to teach voluntary daily care and management behaviors such as nail trims and blood draws to a greater number of the animals in their facility. Finally, one keeper actually said that the only thing limiting them in their training is that they are only allowed to train the animals at certain times because the training occurs in their holding area, which is out of the view of the zoo's guests. But when the time arrives for training to be conducted, they have plenty of time to accomplish anything they desire.

What research do you think needs done in the field or what would you like to know more about regarding positive reinforcement training and animal behavior?

Responses to this question varied considerably. Two trainers discussed how they would like to see more research on animals' learning processes and their sentience, and studies that continue to work out what the best methods of training are. Additionally, research on training aquatic animals and terrestrial invertebrates would be beneficial. Another trainer stated that they would appreciate more education surrounding the proper vocabulary to use in training. A different trainer said that they want to learn more about advanced training, such as how to incorporate more primary and secondary reinforcers and variable reinforcement schedules. This would be beneficial in situations such as when their pinnipeds, as is natural for them to do, stop eating for extended periods of time, during which they will not respond to anything the trainers are asking because the only primary reinforcer they respond to is food. This led the trainer to realize the importance of knowing each animal species' ethology and their motivations to work for different reinforcers, which is essential to incorporate into their training plans. This issue was

also obvious with the porcupines, which are very inactive during the winter and the day. During the summer, the porcupines learned new behaviors quickly but during periods of inactivity when the weather is cooler, they mostly just practice their shifting behavior from one enclosure to the next. The final example this trainer gave regarding the importance of the seasonal behavior and ethology of animals was with the bears, which they are unable to train at all during their breeding season. The trainer explained that feeding one bear and not the other during a training session can create aggression, so the focus is less on training and more on enrichment. Finally, a trainer discussed a desire to understand how having a choice can be a primary reinforcer for an animal, and how that could be incorporated into training sessions.

Are there any unique stories or big takeaways that you would like to share?

In answer to this question, one keeper told a story about a silverback gorilla that was in training for a voluntary blood pressure reading. To measure a gorilla's blood pressure at this facility, the enclosure has a mesh sleeve which encloses a cuff, inside of which is the actual blood pressure cuff. Many primates break the cuffs when they are learning this behavior. However, there was one silverback which ripped the cuff out accidently, but rather than throwing it down like every other primate had done, he took the cuff and tried to place it back inside of the sleeve. This gave the trainer a peek at the intelligence level and cognition of this animal. The keeper also was excited about their successful training of a voluntary blood draw with their gorillas, because they said that only about 20 of the 300 gorillas in captivity in the United States successfully perform that behavior.

Another trainer spoke about the importance of listening to other trainers' perspectives and ideas. They said that it does not matter what animal species they are talking about, one should learn how to generalize topics and concepts so that it can be applied to different animal species.

Finally, the last trainer talked about the importance of using a "jackpot," which they explained was a really large reward. A snow leopard at their facility has a degenerative eye issue which requires eye drops every day. To give him eye drops, trainers first taught him a "hold" behavior where he remained still, and his primary reinforcer was whipped cream. Then, after the trainers gave him the eye drops, they delivered to him a jackpot of whipped cream and rewards to teach him that this behavior, which they must ask for every day, is really fun. Thus, they are working hard to give the snow leopard a high motivation and desire to listen to the trainers and keepers.

Discussion

In this study, the researcher conducted phone interviews with trainers at zoos and wildlife rehabilitation centers in the eastern United States to determine whether these facilities were implementing training programs using positive reinforcement training methods to their greatest potential, and to unearth what questions current trainers in the field have regarding this area of research. Based upon the answers that the interviewees gave, positive reinforcement training methods are being used in zoos and wildlife rehabilitation centers in the eastern United States. These methods are being used to accomplish a large number of tasks which allow greater ease for the keepers when performing duties relating to animal husbandry and welfare. From voluntary blood draws to body part presentations to locomotor activities, the trainers interviewed all agreed that the behaviors they were teaching their animals were helping both the keepers and the animals, and that positive reinforcement training methods were responsible. Additionally, one trainer mentioned that their training program has a Training Resource Team which is constantly reviewing the latest studies and information on positive reinforcement training and its applications. The trainer stated that this team has been extremely beneficial, and may be something valuable that other programs should attempt to implement.

Common themes arose amongst the interviews conducted. Firstly, many of the trainers explicitly discussed giving their animals the choice to participate in a training session. Pryor (1984; 2009) emphasized this idea throughout her publications, discussing how this ability to choose often produces an animal more willing to participate, and one who is more exploratory and seeks to perform the behavior for which the trainer is looking. Giving the animals a choice, according to the trainers interviewed, helps to build trust and encourage respect. This trust and resulting relationship between keeper and animal was a second common theme. Each trainer interviewed talked about how they felt that positive reinforcement training methods helped build a stronger and deeper relationship, and they all felt strongly about this. Additionally, they all believed that their training programs which used positive reinforcement training methods were the best training programs for their animals, and they could accomplish the most with their animals because of these methods.

But in order for these relationships to grow, the trainers had to be flexible and adaptable. Nearly all of them discussed the importance of understanding that each species and each individual animal is unique and different from every other animal regarding its personality and its capacity to learn, as well as how it learns. These differences could come down to a simple preference of a clicker over a verbal phrase as a secondary reinforcer. Animals could even learn differently or be more or less motivated to learn depending on the season and time of day, making understanding their natural behaviors and ethology an important concept for trainers to know. Therefore, trainers must be willing to adjust their training plans to accommodate for these differences as well as for times when the animal either excels or works slower than expected. It is the trainer's job to keep up or slow down with the animal to ensure the best learning process. One trainer explained this idea very clearly when they discussed their hawk which needed to be

taught at least two behaviors at the same time. In this scenario, the trainer had to be observant and practice trial-and-error until they figured out what worked for the hawk, as well as be flexible in their approach. A different trainer further emphasized observational skills as essential, because they allow the trainers to catch on to personality quirks and to use them to their advantage when trying to teach a behavior. Lastly, two of the keepers briefly discussed the importance of looking to peers, mentors, and professionals for guidance when challenges arise to which they do not know the answer. Exploring how new ideas and information from studies and professionals can be disseminated throughout animal training programs might be worth looking into to aid trainers.

One trainer discussed the interesting concept of using a time-out from a training session to discourage a behavior. In discouraging a behavior from occurring in the future, the time-out actually functions as a punishment, discussed by both Pryor (1984) and Domjan and Grau (2015). This seems to support the idea that positive reinforcement training is so desirable for an animal that purposeful lack of it is actually aversive, whereas participating in the training is desirably stimulating, exciting, and "fun" according to Pryor (2009). This could be one factor that has contributed to the suggestion that this training increases animal welfare, but also supports its use as a tool to increase welfare, especially when combined with enrichment plans as done by Dorey et al. (2015), Fernandez et al. (2019), and Neto et al. (2016).

Limitations and Future Research

This research study must be repeated and modified to fully accomplish its goal. With only six animal trainers that responded and were willing to participate in an interview, this study cannot be a fully accurate representation of the population of behavior and training programs for captive wild and exotic animals throughout the United States. This lack of responses represents

the major limitation of the study. Zookeepers and animal caretakers are by nature very busy individuals, something that was even emphasized by a few of the trainers that were interviewed. Perhaps lack of available time is one reason that so few people responded to the call to participate. Another issue may have been that the author conducted the interviews by phone, which could also be related to the trainers not having time for the interview. If the interviews were conducted in person, there is a chance that more people would have been willing to participate. The interviewer could have travelled to each zoo to meet the trainers face-to-face, build rapport, and even conduct the interview while the trainer was working so that they could use their time more efficiently. In the future, this might be an option to encourage greater participation. Furthermore, future researchers should consider observing training sessions and reviewing any documentation or manuals provided by the zoos and wildlife rehabilitation centers on their programs to further elucidate the methods being implemented.

Despite the low number of interviews, the data collected still has value. Certain zoos and wildlife rehabilitation centers are utilizing positive reinforcement methods to allow better care for their animals by decreasing stress, building deeper trust and stronger relationships with their keepers, and allowing for a multitude of voluntary medical procedures to be performed without the need for anesthesia. Additionally, these interviews have shed light on areas in this field of training where future research could be conducted. One such area involves animals' motivations for learning and working for rewards during seasons or even just during a time of the day when they are normally not motivated to work for the primary reinforcers that their trainers are offering. Pryor (1984) emphasized using reinforcers that are motivating for each specific animal. Perhaps future studies could focus in on specific animal species to determine a range of potential reinforcers when food is no longer an option. This of course could only be useful to a certain

extent because what is actually reinforcing for an animal is dependent also on each animal as an individual. Furthermore, one trainer that was interviewed discussed best methods while another talked of greater education on the subject, and these two areas could be combined. Systematic studies should be conducted to add a greater depth of data to the field regarding the efficacy of positive reinforcement training compared to traditional methods, which will in turn aid in determining best practices and methods for captive animal care. Once this information has been obtained, some method is needed for disseminating this information to those employed in this industry who could benefit from it. But currently, the information that is known, and the vocabulary and how to apply it, should be clarified for trainers so that they understand what they are training. Rather than just understanding what works in training animals, it may help trainers to understand why what they are doing is working so that when they run into challenges and an animal is having trouble grasping a concept, they may have an easier time finding a solution if they understand how the animal is learning. Of course, researchers have endeavored to better understand an animal's mind and how they learn for a long time, and this specific prompt for research is nothing new.

Conclusion

Some animal trainers working with captive wild and exotic animal species at zoos and wildlife rehabilitation centers in the eastern United States are currently utilizing methods of positive reinforcement training to teach their animals many different behaviors, and this training is enhancing the care they receive. While more interviews should be conducted to learn the state of animal behavior and training programs in a greater number of facilities to further support the results from this study, this study does show that where these methods are being utilized, trainers are seeing real results. The more these methods are implemented, the more trainers and

researchers will learn about what they can accomplish with these methods. This will in turn teach them more about the animals in their care, allowing them to further improve animal welfare. This positive effect can reach out to the wellbeing of the animals' keepers, the enjoyment of those animals by the public, and through a positive public perception can benefit the facility at which those animals are housed. Thus, positive reinforcement training methods are a worthwhile teaching option for anyone working in animal care.

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