

**The Artful Application of the Science of Behavior Change in Crocodilians: A Guide for the
St. Augustine Alligator Farm Crocodilian Biology and Management Course**

Arianna Bailey, CPBT-KA, CPAT-KA

Chief Development Officer, Natural Encounters, Inc. www.naturalencounters.com

Past President, IAATE www.iaate.org

I. Introduction: Understanding Observable Behavior

The effective training of crocodylians necessitates a foundational understanding of observing and evaluating behavior. In this context, observable behavior refers to actions and responses that can be objectively measured, distinct from assumptions about an animal's internal thoughts or feelings. As trainers, our insights into what an animal is thinking are inherently limited; therefore, focusing on what the animal does, what we can see an animal do, provides a concrete basis for shaping behavior.

Observing behavior may be simple, but it is not always easy; it requires keen attention to detail, patience, and an appreciation for the uniqueness of each individual animal. This emphasis on observing overt behavior aligns with the key principles of operant conditioning. By concentrating on the outward manifestations of behavior trainers can establish a feedback loop, or a common language in which two-way conversation is possible, with the animals they work with.

A critical point to consider is the avoidance of constructs, or labels, when describing behavior. Constructs, in this context, refer to subjective interpretations about an animal's mental state. For example, if an animal is not responding to a cue, we might label them "lazy", "difficult", or "dumb", but none of these constructs describes what their behavior looks like. Relying on constructs can lead to self-fulfilling prophecies. Communication breakdowns among trainers are probable when relying on labels to describe behavior, as individuals may interpret them divergently, leading to inconsistencies impeding the progress of the training plan. Furthermore, constructs remove responsibility from the trainer and attribute behavior solely to the animal's perceived mental state. This paper advocates for an objective, observable approach, focusing on operationalizing the behavior of crocodylians.

Understanding behavior as a dynamic interaction between environmental conditions forms the basis for effective training. The most basic units of operant conditioning can be broken down into antecedents, behavior, and consequences. Antecedents are environmental influences that set the stage for behavior to occur and precede the behavior, Behavior is what we can see the animal do, and Consequences, whether reinforcing or punishing, are what happen immediately following a behavior and influence whether that behavior will occur again in those conditions in the future. These are the operant conditioning ABCs. The core principle here is that effective training is achieved by controlling antecedents and consequences, not attempting to control the animal or its behavior directly.

Moreover, the paper emphasizes that to change behavior, one must change the environment. Recognizing that animals respond to their surroundings allows trainers to manipulate these factors to encourage desired behaviors and discourage unwanted ones. This sets the stage for the subsequent exploration of operant behavior principles, reinforcing and punishing procedures, and the ethical hierarchy of behavior-change procedures outlined by Dr. Susan Friedman in her least intrusive effective procedure diagram featured below (see Fig. 1).

In essence, this introductory section establishes the premise that successful crocodylian training relies on a thorough understanding of observable behavior, a commitment to avoiding subjective constructs, and an appreciation for the relationship between antecedents, behavior, and consequences and how it plays into the artful application of the science of behavior change. The subsequent sections will delve into these principles in greater detail, providing a comprehensive guide for the St. Augustine Alligator Farm Crocodylian Biology and Management Course.

II. Operant Behavior Principles: Antecedents, Behavior, Consequences

Operant behavior principles lie at the heart of effective crocodilian training. This section expands on the fundamental components of operant conditioning—antecedents, behavior, and consequences—and explores how manipulating these elements can yield successful behavior change.

Antecedents: Setting the Stage for Behavior

Antecedents are the environmental cues or conditions that set the stage for an animal's behavior. Understanding and controlling antecedents is a powerful tool for trainers. It involves creating an environment that encourages desired behaviors while minimizing opportunities for undesirable ones. For example, modifying lighting conditions, enclosure layout, working on land or in water, or the presence of specific objects can influence how a crocodilian responds to training cues.

Recognizing antecedents' contribution to behavior helps trainers predict and manage responses. This proactive approach shifts the focus from reacting to behavior after it occurs to shaping the environment to guide behavior in the desired direction. It is also important to remember that past consequences for behavior become future antecedents. When an animal can predict a valuable, desired outcome from previous experiences it contributes to current conditions and drives behavior.

Behavior: A Function of Consequences

Behavior, in the context of operant conditioning, can be viewed as a function of its consequences. Behavior is anything we can observe that an animal does. This principle underscores the idea that an animal's actions are influenced by the outcomes of those actions. In the early 20th century Edward Thorndike (Thorndike, E.L., 1911. *Animal intelligence: Experimental Studies*. Macmillan) proposed the Law of Effect, which states that connections leading to satisfying outcomes are strengthened while those leading to unsatisfying outcomes are weakened. This means if a behavior leads to an appetitive consequence, something the animal wants such as receiving a treat, the likelihood of that behavior recurring in the future increases. Conversely, if a behavior results in an undesirable outcome, or aversive consequence, the animal is less likely to repeat it. All living things operate under these principals, to use their behavior to either gain something or to avoid it.

Understanding behavior as a product of consequences empowers trainers to strategically reinforce desired behaviors and, when necessary, discourage unwanted behaviors. Ignoring unwanted behaviors and reinforcing desirable behaviors will in turn produce more desirable behaviors and discourage unwanted ones. This principle forms the basis for positive reinforcement, negative reinforcement, positive punishment, and negative punishment—the four quadrants of operant conditioning. Consequences play a pivotal role in shaping and driving future behavior.

Effective Training: Through Environmental Control

The core message is clear: effective training comes from controlling antecedents and consequences rather than attempting to control the animal directly. Trainers are encouraged to recognize the power of modifying the environment to encourage desired behaviors and discourage undesirable ones. This understanding sets the stage for the subsequent exploration of reinforcing and punishing dynamics, problem behavior resolution, and the establishment of relationships and trust.

III. Reinforcers and Punishers: Positive and Negative Dynamics

Building upon the foundation of operant behavior principles, this section delves deeper into the intricacies of both reinforcing and punishing consequences. Recognizing the dual nature of these elements, both positive and negative, is essential for effective crocodilian training.

•**Reinforcement:** This process involves maintaining or increasing a behavior by either presenting or adding something appetitive (+) or removing something aversive (-). Think of the (+) or (-) as adding or subtracting something from the environment, as opposed to something “good” or “bad”. Positive reinforcers can include food, praise, attention, enrichment, tactile stimuli, heat, and shelter. Negative reinforcers can involve the removal of aversive stimuli, such as loud noises, restraint, or handling. It’s crucial to recognize that what constitutes a reinforcer can vary among individuals. What one animal finds reinforcing, another may find aversive. This subjectivity highlights the importance of individualized training approaches.

•**Punishment:** This process aims to decrease a behavior by either presenting or adding something aversive (+) or removing something appetitive (-). Positive punishers can include actions like tapping on the nose, pushing, loud sounds, or handling. Negative punishment can involve removing access to resources, such as food, escape, or conspecifics. The section also addresses the four detrimental side effects of punishment, including escape/avoidance behaviors, increased aggression, apathy, and phobia or overgeneralized fear of the environment. Trainers are cautioned about the limitations of punishment, emphasizing that it rarely tells the animal what TO DO and is most effective in reducing behavior when applied at a level approaching a life-threatening consequence, which is something the vast majority of trainers would avoid.

Reinforcers: Maintaining and Increasing Behaviors

Reinforcers serve as powerful tools in shaping behavior, and trainers should understand the dual avenues through which they operate: positive (+) and negative (-). Positive reinforcement involves presenting or adding something desirable after a behavior occurs, thereby increasing the likelihood of that behavior happening again. Negative reinforcement, on the other hand, entails removing or avoiding something aversive, also increasing the probability of the desired behavior.

Examples of Positive Reinforcers:

- **Food:** Offering a treat immediately after a desired behavior.
- **Praise:** Providing verbal acknowledgment or positive vocalizations.
- **Attention:** Interacting with the animal, giving it focus and acknowledgment.
- **Enrichment:** Introducing novel objects or activities into the environment.
- **Tactile Stimulation:** Physical contact like a scratch or body rub after a desired behavior.
- **Heat and Shelter:** Providing a comfortable space in the environment.

Examples of Negative Reinforcers:

- **Loud Noises:** Stopping a loud or aversive sound when a desired behavior occurs.
- **Restraint:** Relaxing physical constraints in response to the animal’s cooperation.
- **Tactile Relief:** Allowing an animal to move away from touch upon the completion of a behavior.
- **Handling:** Minimizing physical manipulation as a reward.
- **Attention:** Offering relief from attention or interaction when desired behavior is displayed.
- **Nose Tapping:** Stopping nose tapping as a reinforcer for cooperation.

It's crucial to understand that the meaning of reinforcers is subjective; what one animal perceives as positive reinforcement might be perceived differently by another, and we can't know if a stimulus even earns the title of 'reinforcer' until we see the effect it has on future behavior. This individual variation underscores the importance of tailoring training approaches to the unique preferences and responses of each individual.

**Contextual Crocodilian Insights*

Food reinforcers can vary in size, type, and quantity and should vary throughout the training session to strengthen the behavior. This variability helps to maintain motivation by keeping the training session engaging. Using smaller sized reinforcers can help maintain momentum during a training session. Larger items take longer to consume and can slow down a training session and decrease motivation as the animal becomes satiated. It is also important to discover what reinforcers are highest and lowest value to the individual. Utilizing high value reinforcers for more difficult behaviors can make those behaviors worth doing again. Offering multiple reinforcers after one behavior is performed at a high level can also help to strengthen that behavior and increase the likelihood of the animal doing that behavior in the future. Our job is to make sure the behaviors we are asking our animals to perform are worth doing again. If a trainer gives a cue and an animal can predict, due to the past history of consequences, a high value reinforcer will directly follow the performance of that behavior, then the animal is more likely to perform that behavior fluently and consistently.

Control: A Primary Reinforcer

Referencing Watson's seminal studies from 1967 and 1971, offering control can significantly enhance resilience in behaviors and foster trust in both trainers and the environment. In Watson's studies he demonstrated the emotional gain and increase in response in 3-month-old babies when given control over their environment. The babies were lying in their cribs with their heads on a pillow. In the first group of babies under each of the pillows was a switch that turned on a mobile above them anytime they moved their heads. The second group of babies had no control over the operation of their mobiles and the mobiles would move automatically, non-contingent on their head movements. The first group of babies not only saw an increase in head movements over time as they learned they could control their mobiles, but they also showed more happy behaviors that persisted longer than the other group such as cooing and smiling. As the experiment continued the second group of babies stopped showing any happy responses to the mobile's movement. This important study shows the need for trainers to understand the significance of using control as a reinforcer when working with crocodilians. For instance, empowering a crocodilian to control its environment, by managing the shift enclosure door, can profoundly impact their engagement and cooperation. Crocodilians can learn to understand that their behavior has the power to allow them to leave an area without being trapped inside. When the crocodilian learns that their actions prompt the door to open, granting them a sense of agency, they become more inclined to remain in the designated area. This empowerment reinforces their trust in the training process and strengthens their bond with their trainers.

**Contextual Crocodilian Insights*

Teaching a shift behavior using control as a reinforcer

The key component of a training plan employing control as a reinforcer in teaching crocodilians to shift between locations involves granting the animal control over the opening and closing of the shift door. The initial phases of the training regimen may entail placing a bait into the shift area and subsequently offering a follow-up food reinforcer upon entry to ensure a desired consequence is received if the animal enters the shift. Throughout this early part of the process, the shift door remains open, allowing the animal to freely exit if desired.

As the animal demonstrates comfortable behavior within the shift space, which can occur quickly in many cases within a few short repetitions, the door is gradually moved. If the door movement does not prompt the animal to leave, an additional food reinforcer is provided for staying in the shift. Conversely, if the animal moves toward the door, it is fully opened to accommodate their exit. Upon the animal's return to the shift area, a food reinforcer is again offered.

As the door is moved up or down, if the animal directs its attention toward the door, it is opened, as if the animal's movement toward the door is a request, asking for the door to be opened, and the trainer answers by "listening" to the animal's body language/non-verbal communication, and opens the door. Conversely, if the animal shifts its focus back to the trainer, another food reinforcer is provided. This process is repeated each time the door is adjusted, with the animal's behavior guiding the reinforcers and the doors movement.

Whenever the animal indicates a desire to leave by moving toward the door, the door is fully opened in response to their behavior. As the door remains shut and the animal maintains focused, calm behavior, the trainer gradually extends the duration of door closure and compensates with reinforcers.

Throughout the process, it's essential to acknowledge the animal's cues, particularly when they approach the door, as it indicates a request for the door to be opened. Responding promptly to these cues reinforces the animal's trust in their ability to influence their environment through their behavior, fostering a sense of control and security.

Once the crocilian consistently demonstrates comfortable behavior within the shift area and the duration of door closure increases, the reliance on control of the door as a reinforcer diminishes. However, the use of consistent food reinforcers remains integral to maintaining the strength of the shifting behavior over time.

In the event of behavior regression, it is prudent to relax criteria and revert to earlier steps in the training process to rebuild trust and gradually increase the criteria level to previous levels of proficiency. This adaptive approach ensures ongoing success and reinforces positive training outcomes.

Punishers: Decreasing Behaviors

Punishers, both positive and negative, aim to decrease the likelihood of a behavior. Positive punishment involves presenting or adding something aversive, while negative punishment entails removing or withholding something desirable.

Examples of Positive Punishers:

- Tap on the Nose: Administering a light tap, in practice commonly done with a stick, as a consequence for undesirable behavior.
- Pushing/Physical Manipulation: Using physical contact to discourage unwanted actions.
- Loud Sounds: Introducing loud noises as a consequence for undesirable behavior.
- Handling: Implementing controlled handling or restraint in response to undesirable behavior.

Examples of Negative Punishment:

- Removing Access to Food: Temporarily limiting access to food as a consequence.
- Removing Access to Escape: Restricting escape routes as a consequence.

- Removing Access to Conspecifics: Isolating the crocodilian from others as a consequence.

The subjective nature of punishers is emphasized, highlighting that what may serve as a deterrent for one animal might not be perceived similarly by another, and, as with reinforcers, a stimulus only earns the title of ‘punisher’ when we see its effect on future behavior. Understanding these dynamics lays the groundwork for the subsequent discussion on the detrimental side effects of punishment and the ethical considerations of behavior change.

**Contextual Crocodilian Insights*

Today it is common practice for crocodilian trainers to use a stick, typically a broom handle, as a training tool. An animal is called to approach a trainer on land, as the animal approaches the trainer positive punishment is often utilized by tapping the animal on the sensitive tip of its nose near the nostrils to get the animal to stop approaching. By adding (+) the stick and tapping on the nose to get the animal to decrease, or stop, the approach behavior this method is a positive punishment approach. The stick is also commonly used as negative reinforcement to get an animal to turn around. By poking the stick in the soft fleshy area directly behind their rear legs, crocodilians react by spinning toward the side being poked. Once the animal spins in the desired direction the stick is removed (-), thus increasing the spin or turn behavior by removing the stick. Positive punishment always has elements of negative reinforcement at play and vice versa as one behavior stops happening, another behavior starts happening, all in association with the same aversive stimulus.

Detrimental Side Effects of Punishment:

The section concludes by addressing potential detrimental side effects associated with the use of punishment in training. These include escape/avoidance behavior, increased aggression, apathy, and an overgeneralized fear of the environment. Trainers are reminded that punishment doesn’t instruct animals on what TO DO; it only attempts to discourage undesirable behavior, often with limited efficacy. The discussion sets the stage for considering alternative, positive reinforcement-based approaches outlined in Dr. Susan Friedman’s hierarchy of behavior-change procedures. (Fig 1.).

IV. Relationships and Trust: The Cornerstone of Successful Training Programs

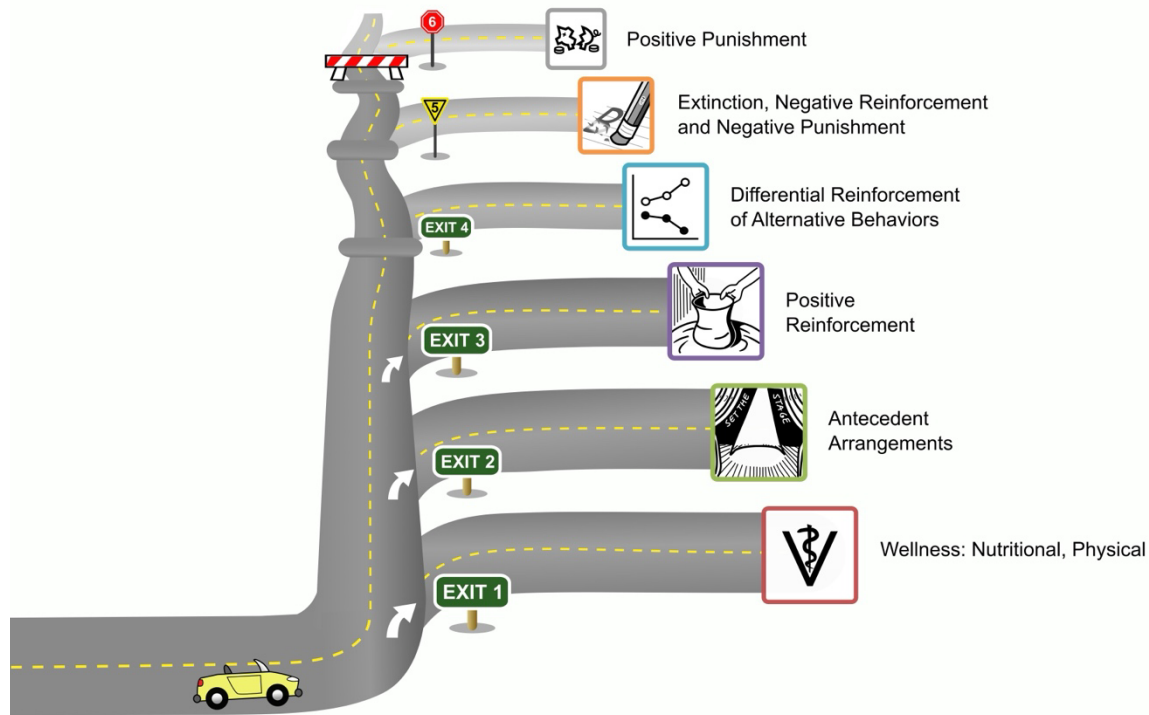
Establishing and nurturing relationships built on trust forms the cornerstone of successful crocodilian training programs. This section emphasizes the importance of cultivating strong bonds between trainers and crocodilians, fostering open communication, mutual respect, and cooperation.

Two-Way Communication: An Essential Foundation to Training Success

Effective communication is essential in building relationships with crocodilians. Trainers must recognize that communication is not limited to verbal cues but also encompasses body language, gestures, and other non-verbal signals. By actively listening and responding to the cues provided by the crocodilian, trainers can establish rapport and create a foundation for mutual understanding. It is helpful to remember that as the trainer you only provide half of the information in a training session, and the animal provides the other half. Carefully listening to your animal by observing their behavior and sensitively and appropriately responding to their half of the conversation, trainers develop a large trust account with their animals and move training sessions ahead toward more productive outcomes.

Trainer-Animal Partnership: Allowing Animals to be Active Participants in Their Care

Hierarchy of Behavior-Change Procedures Most Positive, Least Intrusive Effective Intervention



(CC) BY-NC-ND 2023 Friedman, Fritzier

Figure 1. Dr. Susan Friedman’s proposed hierarchy of behavior change procedures according to the least intrusive, effective intervention principle.

<https://www.behaviorworks.org/files/articles/Why%20Animals%20Need%20Trainers%20Who%20Adhere%20to%20a%20Procedural%20Hierarchy.pdf>

Training is a partnership between trainers and crocodilians, requiring collaboration, trust, and a history of positive interactions between both parties. Trainers bring their expertise, guidance, and reinforcers while crocodilians contribute their cooperation and willingness to participate. This partnership is built on a foundation of trust, with both parties working together toward shared goals. Expert trainers create conditions where animals shape the decisions made in a training session and are flexible with their training plans, making changes moment to moment with the goal to set the learner up for success.

Empowerment through Choice: Give Them a Voice

Empowering crocodilians to have a voice in their interactions fosters a sense of agency and control, strengthening the bond between trainer and animal. Allowing crocodilians to make choices within the training environment encourages engagement and cooperation, as animals are empowered to take an active role in their interactions and voluntarily participate in their care. When crocodilians say “no” through their body language and the trainer listens by respecting their choice instead of forcing participation, the crocodilian is more likely to say “yes” in the future. That kind of trust is

built on an understanding that if they feel uncomfortable or a behavior is not worth doing for the consequences available, they have the ability to say no. That level of empowerment also builds strong relationships and resilient behaviors that will persist under many variable environmental conditions.

Trust Building: Increasing Likelihood of Positive Interactions

Building trust is a gradual process that requires patience, consistency, and positive reinforcement. Trainers must demonstrate reliability and predictability in their interactions, ensuring that crocodilians feel safe and secure in their presence. Trust is established through positive experiences and reinforced through consistent reinforcement of desired behaviors. The construct or label “trust” can be operationalized as a level of certainty that interactions will result in good outcomes, so interactions increase. Trust is not just something that can be increased between humans and animals, animals also need to build trust with the environment. Positive interactions with certain objects help to build trust in that object. Compare trust building to a bank account. When positive interactions occur, deposits are made into the trust account, when aversive interactions occur, withdrawals are made from the trust account. When many deposits are made over time and your trust account is high, a small withdrawal will not bankrupt your account. For all trainers and animal caretakers, withdrawals are inevitable. We may have to capture and restrain an animal for a vet visit, or we might have to use positive punishment to separate two animals during an aggressive interaction, but these experiences will not bankrupt our trust accounts with our animals if we regularly make deposits through our daily interaction.

Positive Reinforcement: A Path Toward Stronger Trust Accounts

Positive reinforcement plays a central role in building trust and strengthening relationships between trainers and crocodilians. By rewarding desired behaviors with treats, praise, or other reinforcers, trainers strengthen the bond between themselves and the animal. Consistent use of positive reinforcement helps to create a positive training environment where crocodilians feel motivated to participate and engage. It also is one of the best ways to build up your trust account.

Respect for Individual Differences: A Study of One

Each crocodilian is unique, with its own personality, preferences, and learning style. Trainers must respect these individual differences and tailor their approach accordingly. By understanding and appreciating each crocodilian's unique characteristics, trainers can build stronger, more meaningful relationships and achieve greater success in their training efforts. Each animal is a study of one, but each moment in time is also unique. There are many factors that impact your training sessions. The learner's individual history, your skill set and experience as a trainer, as well as the environmental conditions at that particular moment in time all influence behavioral outcomes. As conditions change, behavior changes and this dynamic process is never complete, it will always be a work in progress.

Conclusion: Relationships are the Foundation to Training Programs

In conclusion, relationships and trust are fundamental components of successful crocodilian training programs. By fostering open communication, trust built through positive experiences, and cooperation, trainers can build strong bonds with their crocodilian counterparts, creating a positive training environment where animals feel safe and motivated to participate. Through patience, consistency, and a commitment to the most positive least intrusive effective methods, trainers can cultivate trusting relationships that form the basis for successful training outcomes.

V. Shaping: Reinforcement of Successive Approximations

Shaping represents a sophisticated approach to behavior modification, relying on the reinforcement of successive approximations toward a desired behavior. This section explores the intricacies of shaping and offers practical insights for effective implementation in crocodilian training programs.

Understanding Shaping: Steps to Meet Criteria

Shaping involves breaking down complex behaviors into smaller, manageable steps and reinforcing each successive approximation toward the target behavior. Trainers begin by reinforcing behaviors that will build towards the desired behavior and gradually raise the criteria for reinforcement as the animal progresses.

Guiding Principles of Shaping:

- **Set Goals:** Describe the goal behavior and then break it down into approximations, or small steps, that you can train individually to reach your end goal.
- **Establish Criteria:** To guide the shaping process, establish cues and clear criteria for success. These criteria serve as benchmarks for progress and ensure consistency in reinforcement.
- **Be Flexible:** Adaptability is key in shaping. Trainers must be prepared to adjust their criteria based on the individual animal's response and motivation.
- **Knowing When to Move Forward:** Trainers must determine when to progress to the next approximation. Reinforcing the same approximation for too long may hinder progress.
- **Fading Prompts:** While prompts are useful tools in shaping, they should be faded quickly so the animal doesn't rely on them to perform the behavior. However, trainers must be prepared to reintroduce prompts if needed when behavior breaks down or the animal needs additional information.
- **Let Behavior Be Your Guide:** Shaping requires a balance between maintaining and relaxing criteria. Trainers should be prepared to relax criteria and return to previous steps if necessary to ensure the animal's success.

Prompts in Shaping: Useful Tools

Prompts serve as aids in guiding the animal toward the desired behavior. A prompt is any environmental stimulus to help the animal understand and perform the desired behavior. Prompts are similar to cues but are meant to be faded out and cues are meant to be left in. Cues serve as antecedent information that tell the animal when to perform a particular behavior while prompts are information that lead the animal toward a desired behavior during the shaping process. Baits or lures are a commonly used prompt, usually in the form of a food item. They are visual or tangible stimuli offered before the behavior is performed to encourage the animal's participation. Baits do not provide a consequence for a desired behavior. Visual baits act as an antecedent, setting the stage for a behavior to occur. Once the animal performs the behavior and accesses the bait it becomes a consequence. Therefore, adding an additional reinforcer after the behavior is performed at criteria is important to further strengthen the likelihood that the behavior will be offered at the same high level of criteria again. Adding an additional reinforcer will also aid in fading out the bait entirely. Prompts are tools that add information to the environment to set the animal up for success. They should be used thoughtfully when needed and faded out quickly as soon as the animal no longer needs them to perform the desired behavior.

Bridging Stimulus: Marking Correct Behavior

A bridging stimulus, also referred to as a conditioned reinforcer or event marker, serves as a signal to the animal that a desired behavior has been performed correctly. Trainers pair a neutral stimulus,

such as a clicker, whistle, slap on the ground or water, or verbal bridge (“good”), with a primary reinforcer (e.g., food), closely and repeatedly to establish a connection between the two. This bridging stimulus allows for precise timing in reinforcement and facilitates communication between trainer and animal. The use of a bridge is important when training a behavior in which you cannot deliver a reinforcer immediately. A bridge is not always needed when training an animal at close proximity. Using a clicker as a bridge can become cumbersome during a training session as it is one more thing you need to hold in your hands during a training session. Bridges should always be backed up by a primary reinforcer to maintain their ability to predict a reinforcer is coming, mark the specific behavior, and provide successful shaping outcomes.

Session Length and Ending: Ending on a Good Note

Trainers must be mindful to go at the animal’s pace during training sessions. Session length should be tailored to the individual animal’s needs and capabilities. Listening to your animals’ voice by being an astute observer of their behavior and responding appropriately in the moment is key to knowing when to end a training session. Ending on a good note, as is often advised by many trainers and training programs, does not mean that the last repetition performed by your animal needs to be at the highest-level criteria. Instead, consider ending your training session when your animals’ behavior shows their motivation to participate has decreased. When striving to push past low levels of motivation with the goal to end on a repetition at the highest level of criteria, it is likely that you will reinforce many more repetitions at lower-level criteria and still not achieve your goal. Deciding to wrap up your session as you see motivation wane sets you up for success during your next session, even if the last repetition wasn’t the best of that session. All the reinforcement history during the current training session will influence future training sessions.

Reinforcers in Shaping: Consequences that Lead to Success

The section concludes by emphasizing the role of reinforcers in shaping. Food reinforcers can vary in size, type, and quantity, allowing trainers to adjust their reinforcement strategies based on the animal’s preferences and motivation level. The timing of the delivery of the reinforcers is critical. Reinforcers must be given immediately following the desired behavior and contingent on meeting the criteria of that behavior. If a reinforcer is delayed by more than just a few seconds after performing a behavior at the expected criteria, then it is unlikely the reinforcer will influence future behavior. By understanding the principles of shaping and the effective use of reinforcers, trainers can guide crocodilians toward desired behaviors with precision and consistency.

VI. Motivating Operations: Influencing Behavior through Environmental Factors

What’s the Motivation?

“Through thoughtful antecedent and consequence arrangement, skilled trainers create motivation for animals to participate in training sessions. 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.” Steve Martin, *What’s the Motivation?*, 2015

Understanding Motivating Operations: Powerful Influence over Behavior

Motivating operations play a pivotal role in influencing behavior by altering the effectiveness of consequences. This section explores the concept of motivating operations and their impact on

crocodilian behavior within the training context, emphasizing the importance of understanding and leveraging environmental influences to optimize training outcomes.

Types of Motivating Operations:

Motivating operations refer to environmental factors that influence behavior by either encouraging it or discouraging it. They encompass a range of environmental influences and conditions that impact behavior. Certain conditions can influence the effectiveness of consequences. For example, cold weather can influence the value of a food reinforcer by decreasing its value and making it less likely the animal will perform a behavior, while that same food reinforcer may be worth the effort to perform the same behavior when weather is warm. These factors can include changes in the environment, the animal's internal state or health, or previous experiences, to name a few. By recognizing and manipulating motivating operations, trainers can enhance the effectiveness of reinforcement in shaping desired behaviors.

- **Relationship Dynamics:** Interactions with conspecifics or trainers can serve as motivating operations, influencing behavior based on social dynamics and relationships.
- **Environmental Stimuli:** Changes in the physical environment, such as the introduction of novel objects or alterations to the training area, can influence behavior by altering the animal's perception and response to stimuli.
- **Learning History:** Past experiences and learning history can serve as motivating operations, shaping behavior based on previous outcomes and therefore prediction of future consequences.
- **Clear, Honest Communication:** Effective communication between trainer and animal serves as a motivating operation, facilitating understanding and cooperation by providing clear signals and cues.
- **Hunger State:** The availability and presentation of food reinforcers can serve as motivating operations, influencing behavior based on the animal's motivation to obtain food rewards.
- **Abilities:** An animal's physical capabilities, health and overall condition can effect motivation to perform a behavior or not.

Utilizing Motivating Operations in Training:

Trainers can leverage motivating operations to optimize training outcomes by strategically manipulating environmental factors to influence behavior. Behavior can only be reinforced if it is offered by the animal. Animals who learn to experiment with their behavior allow trainers more opportunities to offer reinforcement. Motivating operations are one of the important tools that help us to encourage animals to be more creative with their behavior. This may involve:

- **Environmental Enrichment:** Introducing novel stimuli and enrichment activities into the training environment to stimulate the animal's curiosity and engagement.
- **Social Interaction:** Facilitating positive interactions between crocodilians and conspecifics or trainers to encourage social engagement and cooperation.
- **Clear Communication:** Providing consistent and clear signals and cues to guide the animal's behavior and facilitate understanding. Always being honest with criteria and reinforcers builds trust that allows animals to explore their behaviors and discover what earns them desirable reinforcers.
- **Selective Reinforcement:** Timing reinforcers to coincide with favorable behaviors, thereby enhancing their effectiveness and increasing motivation.

**Contextual Crocodilian Insights*

Crocodilian-specific motivating operations to explore are things like training in the water instead of on land. When first working with a new animal, understanding that crocodilians feel more comfortable in the water is a great way to begin to build a repertoire of behaviors. These

behaviors can be framework for understanding that their behavior effects their enviornment and they can control it to produce desirable outcomes. Starting with easy behaviors that can be performed in the water where they feel most comfortable allows for practice that leads to fluency. Repetition builds confidence. Once they understand the behavior-consequence (or B-C) contingency, trainers can move on to developing more difficult behaviors. Another motivating operation that is often overlooked by crocodilian trainers is the size of food reinforcers and the rate of reinforcement. Using smaller items at a higher rate can help build momentum in a training session and will allow for longer training sessions before the animal becomes satiated. This training style can also help with consistency by allowing for more training sessions throughout the week without the concern of overfeeding an animal. Training session length is another motivating operation to consider keeping sessions short but more frequent. Sessions can last only a few minutes and still be very effective. Trainers should always be thinking of how to set their animals up for success through the thoughtful use of motivating operations.

Conclusion:

In summary, motivating operations play a crucial role in shaping crocodilian behavior within the training context. By understanding and manipulating environmental factors such as social dynamics, environmental stimuli, and understanding learning history, trainers can enhance the effectiveness of the reinforcement and punishment process in shaping desired behaviors. By leveraging motivating operations effectively, trainers can optimize training outcomes and promote the development of desired behaviors in crocodilians.

VII. Multiple Animal Sessions: Promoting Cooperation and Engagement

Conducting training sessions involving multiple crocodilians offers unique opportunities to promote cooperation, social interaction, and engagement among the animals. This section delves into the strategies and considerations for facilitating effective training sessions with multiple animals, emphasizing the importance of clear communication, structured routines, and individualized attention.

Establishing Clear Communication: Consistency and Predictable Outcomes

Effective communication is essential when conducting training sessions with multiple crocodilians. Trainers must establish clear criteria and cues to differentiate between individual animals and convey expectations effectively. Some of these cues and antecedents exist naturally in the environment and help each animal understand the criteria being asked specifically of them. Each animal must understand what to do to earn reinforcers. Through consistency, patterns and routines will be developed that help animals understand predictable outcomes if they choose to participate. By ensuring clarity in communication, trainers can minimize confusion and facilitate smooth interactions among the animals.

Structured Routines: Repetition Builds Confidence

Structured routines provide a framework for organizing training sessions and managing multiple animals effectively. Trainers should establish clear routines or patterns for each session, including designated roles for each animal and specific behaviors to be reinforced. Consistency in routine helps to establish predictability and stability, promoting a sense of security and confidence among the animals.

Individualized Attention: Ensuring Criteria is Clear for all Animals

While conducting training sessions with multiple animals, it's crucial to provide individualized attention to each crocodilian. Trainers should observe and respond to the unique needs and preferences of each animal, tailoring their approach accordingly. By acknowledging and addressing individual differences, trainers can foster a supportive and inclusive training environment that promotes cooperation and engagement.

Promoting Social Interaction: Encouraging Desirable Behavior Between Conspecifics

Training sessions involving multiple animals offer opportunities for social interaction and cooperation. Trainers can encourage positive social behaviors by facilitating structured activities that promote cooperation, such as synchronized movements or cooperative tasks. Promoting social interaction not only enhances the training experience but also strengthens social bonds among the animals.

Managing Dynamics: Set Everyone up for Success

Trainers must be vigilant in managing social dynamics and potential conflicts during training sessions with multiple animals. This may involve preemptively addressing potential triggers for aggression or competition and implementing strategies to diffuse tension effectively. By maintaining a proactive approach to managing social dynamics, trainers can ensure the safety and well-being of all animals involved.

**Contextual Crocodilian Insights*

Training multiple animals is one of the most challenging training scenarios. Ensure that each individual animal has a job to do and understands how to do it. If you are working on shaping a new behavior with one individual it will be important to make sure that the other individuals all have a default behavior they can perform and earn reinforcers for throughout the shaping session with the other animal. For example, you might have an enclosure with 2 animals, while shaping a target behavior with one animal, the other might be asked to station at an already established location. It is ideal that this station behavior has a high probability of success with duration. While working with the animal in front of you on targeting you can occasionally toss a reinforcer to the other animal for maintaining criteria at their station. Both animals are engaged and have a clear understanding of the criteria of what their job is and how to earn desirable reinforcers.

Conclusion:

In conclusion, conducting training sessions with multiple crocodilians offers unique opportunities to promote cooperation, engagement, and social interaction among the animals. By establishing clear communication, structured routines, and individualized attention, trainers can facilitate productive and harmonious training sessions that maximize learning opportunities for all participants. Through careful management of social dynamics and a proactive approach to addressing individual needs, trainers can create a supportive and inclusive training environment that fosters collaboration and mutual respect among crocodilians.

VIII. Safety: Prioritizing Welfare and Risk Management

Ensuring the safety of both animals and personnel is paramount in crocodilian training programs. This section underscores the importance of adopting proactive safety measures, cultivating a culture of vigilance, and implementing effective risk management strategies to minimize potential hazards and promote a safe training environment. Many facilities allow trainers to work with crocodilians free contact and it is imperative that individuals understand the risk in working with animals who can potentially cause serious injury or even death. Having a healthy respect for what

crocodilians are capable of, especially large crocodilians, and never becoming complacent when trust is built between animals and trainers will help to keep all involved safe.

Risk Assessment and Management: Evaluating Safety for All

Conducting thorough risk assessments is essential for identifying potential hazards and developing proactive strategies to mitigate risks. Trainers should assess the training environment, equipment, and procedures to identify potential sources of danger and implement appropriate safety measures. By proactively addressing risks, trainers can minimize the likelihood of accidents and injuries during training sessions.

Establishing Safety Protocols: Have a Plan

Establishing clear safety protocols and procedures is critical for promoting safety during crocodilian training sessions. Trainers should develop standardized protocols for handling animals, operating equipment, and responding to emergencies. Training personnel on safety protocols and ensuring adherence to established procedures helps to minimize the risk of accidents and ensure a safe training environment for all involved.

Personnel Training and Supervision: Clear Comprehension of Safety Plans

Providing comprehensive training and supervision for personnel involved in crocodilian training is essential for promoting safety. Trainers should ensure that staff members are adequately trained in animal handling techniques, emergency procedures, and risk management strategies. Supervision and oversight during training sessions help to ensure that safety protocols are followed and that potential hazards are addressed promptly.

Animal Safety: Keeping Welfare as Our Guide

Ensuring the safety and well-being of the crocodilians themselves is paramount during training sessions. Trainers should be attentive to the animal's behavior and body language, anticipating potential signs of stress or aggression. Implementing strategies to minimize stress and create a calm training environment helps to reduce the risk of negative outcomes and promote positive training experiences for the animals.

Guest Safety: Fostering Respect without Instilling Fear

When conducting training sessions in public or educational settings, ensuring the safety of guests and visitors is also important. Trainers should establish clear guidelines for guest interaction with animals, including designated viewing areas and safety protocols. Sharing protocol with guests can be done verbally or with signage. It is important to share facts and not exaggerate in order to gain compliance. Messaging can share safety information and also be entertaining without detracting from important conservation dialogue. Educating guests on appropriate behavior around crocodilians and providing supervision during public demonstrations helps to promote a safe and enjoyable experience for all.

**Contextual Crocodilian Insights*

There are training tools and concepts that have been discussed above that are considered punishers or aversive to animals with detrimental side-effects that need careful ethical considerations before being used. These types of tools should always be considered for training after other more positive and less intrusive methods have been tried. That being said, some of these tools may need to be considered to use as safety measures and as a part of regular protocol to ensure the safety of all involved, such as the use of a stick, like a broom handle. When working

with crocodilians free contact in a training session, the most positive and least intrusive effective methods should be utilized for shaping behavior. This does not negate the fact that trainers need to stay safe and that may involve the use of a stick or other barriers only when safety is being compromised. The aversive tools should not be a tool to shape behavior but should be present and utilized only as a safety tool to prevent any dangerous situation from escalating. Having a stick with you during a training session can be a tool to stop an animal from approaching or to separate two animals during an aggressive interaction. Anytime an aversive is used as a safety tool or if safety is compromised in anyway, staff should meet to discuss the incident and formulate a plan to prevent similar situations from not only occurring in the future but to set all involved up for success in subsequent training sessions. When animals practice a behavior repeatedly, they get better at it and the behavior is more likely to persist so it is imperative they practice behaviors we want to see more of and the environment is not encouraging behaviors we deem unsafe or unwanted.

Conclusion:

In conclusion, prioritizing safety is essential in crocodilian training programs to ensure the well-being of both animals and personnel. By conducting thorough risk assessments, establishing clear safety protocols, providing comprehensive personnel training and supervision, and promoting animal and guest safety, trainers can create a safe and secure training environment that minimizes risks and promotes positive training outcomes. Through proactive risk management and a commitment to safety, trainers can foster a culture of safety that enhances the welfare of all involved in crocodilian training programs.

IX. Communication with Teammates: Fostering Collaboration and Support

Effective communication among team members is essential for the success of crocodilian training programs. This section emphasizes the importance of clear and open communication, collaboration, and constructive feedback to promote a cohesive and supportive team dynamic.

Clear and Open Communication: Honesty Drives Growth

Clear and open communication forms the foundation of effective teamwork in crocodilian training programs. Trainers should establish channels for communication that facilitate the exchange of information, ideas, and feedback among team members. Open lines of communication foster transparency, reduce misunderstandings, and promote a shared understanding of goals and objectives.

Collaboration and Cooperation: Working Together to Meet Goals

Collaboration and cooperation are key components of successful crocodilian training programs. Trainers should encourage teamwork and collaboration among team members, leveraging each individual's strengths and expertise to achieve common goals. By fostering a collaborative environment, trainers can harness the collective knowledge and skills of the team to enhance training outcomes and promote innovation.

Constructive Feedback: When Criticism Becomes Information to Improve

Providing and receiving constructive feedback is essential for continuous improvement and growth within the team. Trainers should encourage open dialogue and constructive criticism, creating a culture where feedback is valued and appreciated. Feedback should be solicited among peers and given in a kind and honest way. Constructive feedback helps team members identify areas for improvement, address challenges, and refine their skills and techniques.

Support and Encouragement: Team Mentality

Supporting and encouraging team members is crucial for maintaining morale and motivation. Trainers should recognize and celebrate achievements, both big and small, and offer encouragement during challenging times. By fostering a supportive and encouraging environment, trainers can boost team morale, enhance motivation, and inspire excellence in performance. Remember that the science of behavior change we have covered above with crocodilian training applies to humans as well, utilizing the most positive least intrusive effective methods when working with our human counterparts fosters stronger relationships, where we all work together and avoid aversive methods that have the same detrimental side effects on us as humans as they do on animals.

Conflict Resolution: Disagreeing Well

Conflict may arise within the team from time to time, and it's important to address conflicts promptly and constructively. Trainers should facilitate open and honest discussions to resolve conflicts, focusing on finding mutually acceptable solutions and maintaining positive relationships. By addressing conflicts in a timely and respectful manner, trainers can prevent tensions from escalating and preserve the integrity of the team. A team that disagrees well learns more and finds solutions quickly so training plans can move forward at the animal's pace without the trainers holding back progress due to lingering disagreements.

Conclusion: A Culture of Caring and Growing

In conclusion, effective communication with teammates is essential for the success of crocodilian training programs. By fostering clear and open communication, promoting collaboration and cooperation, providing constructive feedback, offering support and encouragement, and resolving conflicts constructively, trainers can cultivate a cohesive and supportive team dynamic. It has been shown that healthy, high-functioning teams create better welfare for the animals under their care. Through effective teamwork and collaboration, trainers can achieve shared goals, overcome challenges, and promote the welfare and success of crocodilians in training programs.

Conclusion: Raising the Bar for Training Crocodilians

In essence, the success of crocodilian training programs hinges upon the application of principles rooted in the science of behavior change. By understanding the fundamental concepts of operant conditioning, reinforcers and punishers, and the importance of relationships and trust, trainers can effectively shape behavior and foster positive interactions with crocodilians that promote their voluntary participation in their own care and husbandry. Through the implementation of evidence-based training techniques and the cultivation of strong relationships built on trust and mutual respect, trainers can maximize the welfare and well-being of crocodilians under their care.

Crocodilian Training continues to evolve in zoological institutions and captive settings. More training is happening with this unique and amazing group of animals than has ever been done before. We are at a critical point in this evolution with a need to push our knowledge and skill to the next level. With welfare as our guide, training is critical in promoting best practices that reduce stress, guide husbandry protocols, and increase opportunities for our animals to choose to participate voluntarily in their own care on a daily basis. As crocodilian trainers, we should all be striving for less intrusive methods for management to increase the overall health of the animals in our care and the safety of those who care for them.

Furthermore, embracing a proactive approach to safety, effective communication with teammates, and the utilization of motivating operations are essential elements in ensuring the success and sustainability of crocodilian training programs. By prioritizing safety and risk management, fostering a collaborative team dynamic, and leveraging environmental factors to motivate desired behaviors, trainers can create a supportive and enriching training environment that promotes learning, growth, and positive outcomes for both animals and personnel.

In conclusion, crocodilian training programs thrive on a foundation of scientific knowledge, practical expertise, and a commitment to ethical and compassionate care. By integrating these principles into their training practices, trainers can enhance the welfare and quality of life for crocodilians, while also fostering a deeper understanding and appreciation of these remarkable animals among staff and visitors alike. Through continuous learning, adaptation, and dedication to best practices, crocodilian training programs can serve as models of excellence in animal care and management, paving the way for a future for crocodilians in human care that inspires a deeper understanding and caring conservation action.

Recommended Reading List:

- For more on Antecedents, Behavior, and Consequences: ABCs of Behavior, Dr. Susan Friedman
<https://www.behaviorworks.org/files/articles/ABCs%20of%20Behavior%202004.pdf>
- A flow chart on functional assessments:
<https://www.behaviorworks.org/files/articles/Functional%20Assessment%20and%20Intervention%20Design%20Flow%20Chart.pdf>
- Functional Assessment: Hypothesizing predictors and purposes of problem behavior to improve behavior-change plans, Dr. Susan Friedman:
<https://www.behaviorworks.org/files/articles/Functional%20Assessment.pdf>
- Don't Shoot the Dog, Karen Pryor: https://www.amazon.com/Dont-Shoot-Dog-Teaching-Training/dp/1982106468/ref=monarch_sidesheet
- Learning and Behavior, Paul Chance: https://www.amazon.com/Learning-Behavior-Paul-Chance/dp/0357670914/ref=monarch_sidesheet
- Facts About Punishment, Dr. Susan Friedman
<https://www.behaviorworks.org/files/articles/The%20Facts%20About%20Punishment%202001.pdf>
- More on Fig 1: What's Wrong With This Picture? Effectiveness is not Enough, Dr. Susan Friedman
<https://www.behaviorworks.org/files/articles/What's%20Wrong%20With%20this%20Picture-General.pdf>
- The Power of Trust, Steve Martin: <https://naturalecounters.com/wp-content/uploads/2020/04/ThePowerofTrust.pdf>
- For a deeper dive on bridging stimulus: Blazing Clickers, Steve Martin and Dr. Susan Friedman: <https://naturalecounters.com/wp-content/uploads/2020/04/BlazingClickers.pdf>
- Top 10 Behaviors of Expert Animal Trainers, Steve Martin:
<https://naturalecounters.com/wp-content/uploads/2020/04/Top-10-Behaviors-of-an-Expert-Animal-Trainer.pdf>
- Top 10 Behaviors of Expert Human Mentors, Chris Jenkins:
<https://naturalecounters.com/wp-content/uploads/2020/04/The-Top-10-Behaviors-of-Expert-Human-Mentors.pdf>
- Deep dive into team culture and feedback: Crucial Conversations, Tools for Talking when Stakes are High <https://www.amazon.com/Crucial-Conversations-Talking-Stakes-Second/dp/0071771328>