4

Choosing the Right Method

Reinforcement vs Punishment

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4.1 Introduction

The professional who wishes to train faces a dilemma when making decisions about what methods to follow when training animals. The science, which underpins animal learning, clearly states that when punishment is applied after a behaviour it decreases the frequency of that behaviour, whereas a reinforcement will increase the frequency of the behaviour (Chance 2009; Kazdin 2001; Pierce and Cheney 2008). If we consider that fact alone, it would seem to successfully train we should be prepared to use both reinforcement and punishment in equal measures. Current popular trends, however, lean towards avoiding punishment when possible and focusing on reinforcement (more specifically positive reinforcement). This can be seen in the mission statements of leading zoo training organisations such as the International Marine Animal Trainers Association (IMATA 2019) and the Animal Behavior Management Alliance (ABMA 2019). Similarly, it is part of the mission statement or values of leading domestic animal training organisations such as the Association of Professional Dog Trainers (APDT 2019), the International Association of Animal Behavior Consultants (IAABC 2019), and Karen Pryor Academy (KPA 2019). When choosing a training method you may be inclined to ask whether this trend is based on perception and public relations or is there a solid scientific basis for the popular support for reinforcement over punishment?

4.2 Consequences

When using operant conditioning to train an animal to perform a behaviour, the key factor that needs to be remembered is that behaviour is modified by its consequences (Thorndike 1898). Understanding consequences forms the foundation of operant conditioning and our ability to effectively train any behaviour (Schneider 2012), for example, when a gate is opened and an animal is requested to move from its outdoor exhibit to an indoor enclosure, the animal may be given a piece of food. If that piece of food increases the animal's behaviour of moving from outdoor to indoor then the food is considered a reinforcer because it increases the likelihood that the animal will move into the enclosure the next time they are asked. By contrast a punisher decreases the frequency of the behaviour it follows. If an animal tries to climb out of an exhibit and receives a mild shock when it encounters a live electric wire at the top of the wall, the animal is likely to retreat into its enclosure. The shock would be considered a punisher because it decreases the likelihood that the animal would attempt to climb out of its exhibit in the future.

Zoo Animal Learning and Training, First Edition. Edited by Vicky A. Melfi, Nicole R. Dorey, and Samantha J. Ward.

The basic explanation of reinforcement and punishment is relatively straightforward: most zoo professionals who train do not have difficulty understanding the concepts as described above. When faced with the many types of reinforcers and punishers, however, even an experienced trainer can get confused and feel uncertain about how to apply them.

Consequences can be either unconditioned or conditioned. Unconditioned reinforcers include food, water, social interactions, and anything that serves a biological need. These types of reinforcers are often referred to as primary reinforcers. But animals can learn to accept other things including a clicker, a whistle, or a word like 'good' as reinforcers. If the trainer pairs those sounds with food on a regular basis, they may become conditioned reinforcers, also referred to as secondary reinforcers. When trainers work closely with animals, other conditioned reinforcers may be established; animals may learn to appreciate a rub down or the opportunity to play with a toy as these are also referred to as conditioned reinforcers that can be used to increase the frequency of behaviour. Punishers also can be unconditioned or conditioned. Unconditioned punishers can be anything the animal perceives as aversive that decreases behaviour. There are also many things in an animal's world that may not be initially aversive but the animal learns to dislike them, for example, a crack of a tree limb indicating the approach of a predator and certain people who are aversive, all of which would be considered conditioned punishers. Primary reinforcers and punishers are generally considered more effective when training behaviour because no previous learning history is needed to make them effective (Chance 2009; Kazdin 2001; Pierce and Cheney 2008). However, when used properly, both conditioned reinforcers and conditioned punishers can be effective and useful in training behaviour (Chance 2009; Ramirez 2010; Pryor and Ramirez 2014; see Figure 4.1).

4.3 Choices, Choices, Choices

Most behaviours can be trained using any of the consequence options outlined in the scientific literature (see Chapter 1). It is precisely because

Figure 4.1 In this example of a zoo animal training programme, the bear has been reinforced when a keeper touches a part of its body; this type of behaviour facilitates different husbandry goals including health cheques. *Source:* Steve Martin.

there are so many options available, that the young or inexperienced keeper can be uncertain about how to train an animal's behaviour. Let's examine a typical behaviour needed in a zoo: gating or shifting; moving from one location in the enclosure to another on cue. For a variety of reasons shifting is beneficial, for example when animals move from an old enclosure to a new enclosure. This behaviour can be accomplished by focusing on either the desired behaviour (going through the gate when cued) or the undesired behaviour (staying in enclosure A and not moving).

If we focus on getting the desired behaviour, science informs us that we must use reinforcement. We can use either positive or negative reinforcement. To use positive reinforcement, we can train the animal's behaviour to approach the zoo professional when called, by giving the animal food when it arrives at the desired location. If this behaviour is first trained within the enclosure, it can later be cued (calling the animal) when the zoo professional is in a different position, i.e. on the other side of the gate, in a different enclosure. With appropriate use of positive reinforcement animals can learn to move to a new enclosure when called.

Sometimes an animal might be nervous about crossing a threshold or moving to a location where they have never been before, in which case negative reinforcement might be necessary. If the presence of the trainer or the food reinforcer isn't rewarding enough for them and the need to move them is urgent, trainers might choose to use a net or a board etc. to push the animal through the gate or door. If this equipment has been used previously and the animal associates them with the negative experience (of being caught, pushed, or pulled), the presence of them or of them moving into the animal's flight distance can be enough to cause the animal to move, in an attempt to escape from the equipment and move into the enclosure that does not have the aversive stimulus present. The movement into the new enclosure will have been negatively reinforced, particularly if the aversive stimulus (net, board, etc.) is immediately removed after the animal moves through the gate.

The other behavioural option is to focus on the unwanted behaviour of not moving when cued. Science indicates that if our focus is on decreasing a behaviour, we must use punishment. Continuing with the example above, moving an animal into a new enclosure, the addition of a net, a board, or other aversive equipment into the animal's habitat, the behaviour of staying in the original enclosure is positively punished. Or, another option available, is to simply end the training session if the animal does not move to the new enclosure when cued. By removing the potential for food reinforcement, sometimes termed a timeout, this would be considered negative punishment. By removing something the animal presumably wants, food, right after not responding to the cue to move, it is hoped that the animal will learn that not moving caused the food to disappear. If this timeout is a successful positive punishment, there would be a decrease in the likelihood that the animal would refuse to move following a cue next time the request was made.

If the trainer focuses on getting a desired behaviour, reinforcement must be used. If the focus is reducing a behaviour, punishment must be used. The examples above illustrate how a behaviour can be approached and managed from multiple perspectives. Just because the science seems straightforward, and all methods will achieve the desired outcome, it does not mean that the proper choices are always that clear. For example, one might think a good punishment would be a timeout where the food and the attention of a keeper is taken away. However, in some cases this could reinforce the animal if it doesn't enjoy the keepers attention or the food wasn't of high value. The sections below outline how to choose between reinforcement and punishment and what the zoo professional must consider when choosing the right tool.

4.4 Uses in Training

Professionals skilled in animal training have been using consequences to effectively train an animal's behaviour long before the study of animal learning. The science is clear and the practical applications are evident everywhere that behaviour is trained. Examples of this are provided below:

- Falconry has been popular for centuries. The bird's natural hunting behaviour is used in training; the birds will fly, search for, and catch prey for the reinforcement derived from catching and eating the prey. This behaviour occurs in the wild and can be harnessed in human care, where the prey functions as a positive reinforcer increasing the likelihood of hunting behaviour occurring again in the future.
- In the search and rescue community, dogs are trained to use their nose to find victims trapped or lost in a building. On completion of the task, some search and rescue dogs' behaviour is reinforced after finding a lost person with the opportunity to play with a squeaky toy, a tennis ball, or the chance to play a game of tug. For these dogs these are examples of toys or play being used as positive reinforcement because the likelihood of expressing searching behaviour will increase in the future.
- In typical horse riding, a horse is taught to take riders from place to place. The rider gives the horse direction through the use of reins (straps affixed to a halter around the horse's face and body); these reins are pulled in one direction or another to guide the horse in a desired direction. The horse will feel the pressure of the reins on one side of his face and will move in the opposite direction to relieve the pressure. This is an example of a mild aversive, depending on the force being used by the rider, which is used to change the animal's behaviour and is an example of negative reinforcement because the likelihood of moving in the direction indicated is likely to increase in the future.
- In puppy training, to assist in teaching a young dog not to bite people, new puppy owners might be given two sets of instructions: (i) each time the puppy bites, thump it sharply on the nose to teach the puppy that biting causes it discomfort. This is an example of positive punishment, because it decreases the likelihood that the puppy will bite in the future; (ii) an alternative approach that is sometimes taught is, each time the puppy bites, the owner should stop playing and leave the puppy alone in the room. The removal of play and attention serves as a negative punishment because it reduces the likelihood that the puppy will bite in the future (this technique is sometimes called a timeout).

4.5 Misuses and Challenges

The fact that it is possible to train animals to perform the desired behaviour in so many different ways adds to the dilemma of which methods to choose and which will be most effective? Part of the challenge in using any method is in recognising that its effectiveness is based on using it properly and understanding that misuse can make even the best technique ineffective. A few of the key challenges of applying consequences properly include the following:

4.5.1 Timing

Consequences have proven to be most effective when they are delivered immediately after a behaviour. The longer the gap between the completion of a behaviour and delivery of the consequence, the more likely that the animal learns something other than what is intended. This is true of both reinforcements and punishments, as the following examples illustrate (Chance 2009; Kazdin 2001; Pierce and Cheney 2008).

Poorly timed punishment: a dog owner returns home after a long day at work. He comes into the house to find that his dog has ripped up the sofa, broken several lamps, and

made a huge mess. The dog happily rushes up to the owner when he arrives home. But having seen the mess made by the dog, the owner yells 'bad dog' and perhaps in his frustration even smacks the dog on the nose. The smack and yelling 'bad dog' are certainly aversive and could be perceived as positive punishers; but the timing was very poor. The dog made the mess in the house several hours earlier. By applying the punishment when he did, the owner actually punished the behaviour of happily greeting the owner at the door, not the behaviour of making the house a mess. This misuse of punishment creates confusion for the dog and does not teach the dog what is desired (and in extreme cases can even teach the dog to be fearful of the owner).

Poorly timed reinforcement: an animal has been taught to hold still and present its feet for nail trims. Once the nail has been cut, the animal makes a cooing noise and prances around after which it is given a treat for allowing the nails to be trimmed. Even though the treat followed the nail trim, so did the noises and prancing. The reinforcement could result in an animal that becomes more vocal and more boisterous rather than calm behaviour that allows nails to be trimmed.

Good timing requires good observation and mechanical skills that can only be acquired through practice. In my opinion to assist with timing, it is helpful to use some type of signal to indicate to the animal when a behaviour is performed correctly; this marker may be in the form of a whistle, a clicker, or a word such as 'good'.

4.5.2 Value and Intensity

Consequences can be described in terms of intensity and perceived value to an animal, both of which will vary. In my experience, understanding intensity and value has proven to be one of the hardest things for inexperienced trainers to understand and apply.

Reinforcement value: everything we offer to an animal may be perceived of value, though this value may vary. A morsel of grain, a carrot, an apple, a toy, a scratch behind the ears (for animals where contact is permissible), and the opportunity to play a game may all serve as reinforcers for one animal. But it is likely that each of these items would rank differently in terms of how the animal perceives their value. The morsel of grain might be of low value compared to the apple. The scratch behind the ear might be of low value compared to the toy. Every animal is different and even with the same animal the value of the reinforcer might change across environmental situations. It is important to evaluate which reinforcers are going to be the most effective in any given situation. A morsel of grain may be all that is needed to train a behaviour with an animal that is alone in a habitat with no distractions. But that same morsel of grain might prove inconsequential in a training session that includes several other animals and lots of distractions. It is important to take the time to understand the value of each reinforcer being used whilst training.

Punishment intensity: the value of a punisher is often measured by its intensity. An animal that is afraid of people might find the mere presence of a person in their space as sufficiently aversive to cause that animal to move or change its behaviour. Whilst for another animal the presence of a person may not be aversive at all, yet any type of touch, no matter how gentle, might be unpleasant and thus aversive to that animal. Meanwhile, an animal that enjoys human contact, might find neither of these situations aversive. To use an aversive (so that a punisher or negative reinforcer could be applied) with an animal already comfortable around people might require that a 'scary' object also be present (i.e. an object which is associated with previous situations that were aversive) or that the trainer hit the animal with a certain amount of force. Because of the nature of aversive stimuli, i.e. they need to be unpleasant, it is possible to inadvertently escalate the intensity of aversive stimuli used. It can be difficult to recognise if the intensity is too low to have any impact or too intense and cause unwanted side effects. There are many

possible side effects that may develop from the use of aversive tools, but the most problematic is aggression.

4.5.3 The 'Sneaky' Animal

Another major challenge associated with punishment is that the learner begins to associate punishment as coming from the trainer. When this happens, the animal learns to behave appropriately in the presence of the trainer, because that is the only time that punishment occurs. But in the absence of the trainer, the animal will continue to exhibit the unwanted behaviour, creating the appearance of being 'sneaky', when in reality this happens because punishment is seldom a consequence in the absence of the trainer.

4.5.4 Emotional Responses

Training is successful because of the proper application of scientifically proven learning principles. However, when training animals we can become quite emotionally attached when an animal does something extremely well or extremely poorly. These emotions often cloud our judgement and make it difficult for us to reason through what is happening or adhere as precisely to proven principles. It is often the frustration and anger that comes when an animal is perceived to misbehave that causes the use of punishment to get out of hand. Emotional responses can often be less precise and in many cases too severe; there is a fine line between a well-timed punishment and inhumane abuse.

4.5.5 Misuse of Common Definitions

Too often when training an animal there is too much reliance on common uses of the terms 'reinforce' and 'punish.' In our society we tend to reinforce or punish people and animals, as a result of what we consider good or bad actions. However, that is not how the science of animal learning works. We should never reinforce or punish people or animals. We should only aim to reinforce or punish specific behaviours performed. This difference may seem semantic in nature but there are key pragmatic differences. Two examples in the human world will illustrate the difference:

A child gets a bad report card. The parents choose to punish the child for the grades they received by not allowing them computer privileges for a week. The behaviour of getting bad grades was not punished, that behaviour occurred weeks if not months earlier. Instead the behaviour that was punished was the behaviour of showing the report card and the punishment is more likely to teach the child to not show the report card or to forge their parent's signature on the card in the future. The child was certainly punished, but not for behaviour the parents were targeting!

A criminal commits a serious crime. He eventually goes to jail but sentencing and jail time happen many months (in some cases years) after the crime was committed. A large percentage of criminals go on to commit additional crimes once they are released (Flora 2004). Jail punishes the person (which may be a necessary aspect in modern society) but it does not punish the behaviour.

When punishment or reinforcement is directed at the learner instead of the behaviour, at its best the animal is receiving vague guidance, at worst it is meaningless or teaches the wrong thing. Only when training is focused on behaviour and uses good timing and consequences of appropriate value will training be successful and an animal learn desired behaviour.

4.6 Making an Informed Choice

Choosing the appropriate method requires knowledge and skill. But most importantly it requires setting goals and knowing what you ultimately want to accomplish. By having a clear vision of the behaviour you want from an animal and a set of expectations for that animal's behaviour, you can then create a training plan to achieve those goals and vision (MacPhee 2008). Training new behaviour and

increasing the reliability of the animal to perform on cue is most ably accomplished through proper application of reinforcement.

The scientific study of human–animal relationships (HAR) is an emerging discipline (Hosey and Melfi 2014), but they still remain difficult to explain or quantify scientifically. It is recognised by most zoo professionals that a good relationship with an animal is helpful in training. A well-established relationship appears to create trust between both human and animal, which seems to allow much more to be accomplished, than if no HAR exists. Strong HAR will often open the door to new reinforcement opportunities that otherwise might not be available when training (Ramirez 2010). The use of punishments by contrast, seems to cause trust to break down and HAR to deteriorate. From my experience, a one-time use of a single punisher or the one-time use of an aversive can break down the trust, which has been hard to establish. I have also found that it often takes many reinforcers to offset the damage caused by a single punisher (Ramirez 2013; see Figure 4.2).

Frequently, if we are dealing with unwanted behaviour, it is usually a sign that something happened to punish the desired behaviour that had previously been present. This is not to suggest that the behaviour was purposely punished; we must remember that punishers and reinforcers abound in the natural world. The heat of the day, the physical demands of a behaviour, the aggression displayed by other animals in the environment are all examples of potentially aversive events that could punish the original desirable behaviour. If we try to counter this unwanted behaviour with more punishment, then a situation of competing punishers may be created, and this will often require that the new punishers be of greater intensity to outweigh the already present punishers. Instead of taking such an aversive approach a creative animal care professional will seek out the already present punishers that may be occurring in the environment and attempt to remove or block them. If the aversive stimuli that blocked the desired behaviour and prompted the undesirable behaviour to occur are gone, it opens up the possibility of using reinforcement to get the desired behaviour back.

Figure 4.2 When an animal extends part of its body through the enclosure barrier, it can be viewed as an example of trust between keeper and animal, which has likely been formed through repeated interactions between both parties. *Source:* Steve Martin.

The biggest drawback to using punishment is that no information is provided to the animal about what behaviour is desired. Simply punishing behaviour does not help an animal to understand what it should do in that situation instead. Most behaviours that humans find unacceptable in animals are very natural behaviours: animals bark, scream, roar, or bellow when they are nervous or scared. We often find these behaviours unacceptable, despite the fact that they are naturally occurring and fulfil a function for the animal. Punishing the behaviour of making too much noise does not help the animal understand what would be acceptable in those circumstances. It will learn,

not to perform these vocalisations, much faster if provided with an alternative behaviour to perform under those conditions; one that will keep it safe and earn it reinforcement. So many unwanted behaviours that animals exhibit (fighting, urinating, defecating, digging, climbing, etc.) are behaviours that serve a purpose in the natural world. The fact that we find them undesirable or unacceptable in our world is not something we can expect an animal to understand. Punishing these undesirable behaviours often just creates greater confusion for most animals. We often can mitigate these problems by training the animal to perform an alternative behaviour (O'Heare 2010; Ramirez 1999). Specific examples include:

- Animals that fight and compete with each other at feeding time are behaving as they might in the wild. If we teach the animals that they are only fed if they are sitting on separate rocks, tree branches, platforms, etc., they learn an alternative behaviour to fighting for their food and an acceptable behaviour (sitting in the desired location) that will earn reinforcement.
- A primate that grabs for the trainer (or throws things at the veterinarian) every time a medical behaviour is attempted, can be taught that both hands and both feet must hold on to an object when humans are present to gain reinforcement; specific bars or targets in the enclosure can also be provided. The animal cannot grab the trainer or throw things at the veterinarian if its hands are occupied (see Figure 4.3).
- Animals in free contact that jump all over zoo staff when they enter the enclosure, either to gain attention or to drive staff out of the enclosure, do so because it produces results. An alternative behaviour which can be trained is to provide the animals with a station/location to go to when zoo staff enter the enclosure. For the animal that is attention seeking, reinforcing the behaviour of going to their station and provide appropriate attention to them at the station. For the animal that is trying to

Figure 4.3 It is important to consider keeper safety when training and this might mean training animals so that they are not in a position to grab you; this is especially important if the person training 'has their hands full'. *Source:* Steve Martin.

drive zoo staff out of the enclosure, reinforce them after the zoo staff have left the enclosure. Either way you have taught them an alternative behaviour.

When working with zoo animals, many have reported on the great success they have had focusing on redirection and teaching alternative behaviours to undesirable behaviour through positive reinforcement as opposed to using punishment. The marine mammal community has dealt with aggressive sea lions and focused on positive reinforcement solutions using alternative behaviours and redirection (Graff 2013; Keaton 2014; Streeter et al. 2013). In 1990, Turner and Tompkins wrote about a positive approach to aggression reduction which has become a must-read for the training community and although written about marine mammals, has applications to all zoo animals (Turner and Tompkins 1990). Some zoos have traditionally used punishment and making the transition from forced based training can be a challenging journey and looking at the success achieved with camels should be inspirational for anyone facing the need to make a transition (Urbina et al. 2014).

To aid in the transition and/or adoption of positive reinforcement methods of training, I've outlined a variety of published case studies below, including a wide range of different species being trained for many different purposes, which provide further insight into this journey.

- Using redirection and alternative behaviours to resolve sea lion aggression (Graff 2013; Keaton 2014; Streeter et al. 2013).
- General positive approach to aggression reduction (Turner and Tompkins 1990).
- Camel training transition from force based methods to positive reinforcement (Urbina et al. 2014).
- Resolution of challenges for improved giraffe care with positive reinforcement (Mueller 2003; Stevens 2002).
- Wolf recall behaviour to assist in improved safety (McKeel 2005).
- Improved primate care through positive reinforcement (Hickman and Stein 2009; Russell and Gregory 2003; Russell and Varsik 2002).
- Removal of aversive equipment when training birds of prey (Anderson 2009).
- Gaining trust with skittish birds (Tresz and Murphy 2008).
- Distraction training with positive reinforcement with a variety of species (Leeson 2006).
- Aggression reduction with spotted eagle rays (McDowell et al. 2003).
- Transition from free-contact to protected-contact with elephants (Andrews et al. 2005; Priest et al. 1998).
- General approach to training multiple species and eradicating unwanted behaviour by focusing on positive reinforcement (Joseph and Belting 2002; Lacinak 2010; Ramirez 2012; Scarpuzzi et al. 1991; Seymour 2002).

4.7 Ethical Considerations

The science behind the use of reinforcers and punishers is very clear as described above. By their very definition, both types of consequences work when applied with vigilance and good timing. The debate over which method to use cannot be won by arguing that one is more effective than the other. Additionally, there are very few trainers that rely entirely on one side of the equation. It would be nearly impossible to use nothing but reinforcement or nothing but punishment. Because even if you attempted to only use one of these methods, the environment is full of reinforcers and punishers which impact the learning progress of your animal continuously. So, to be effective you are constantly having to adjust your training decisions to compensate for consequences which exist in the environment, your animals past experience and their natural behavioural tendencies.

Many who train animals are bound by rules and guidelines put in place by their respective organisations. These guidelines may be based on scientific principles, but in many

cases they are influenced by other outside factors:

- Speed of behavioural acquisition: in some training environments getting results fast may lead to job promotions and be perceived as a better trainer. The choices about which methods were used to get the desired behaviour/results may not matter to those organisations. Or, whilst it may matter, they choose not to ask how the behaviour was acquired.
- Behavioural reliability: in many training circles the key to success is whether or not the behaviour is just as reliable weeks, months, or even years after its initial acquisition. The animal trained to give a blood sample to monitor its diabetic condition is not very helpful if the behaviour breaks down after only one or two samples are drawn. The animal trained to cooperate in a research study will fail to be useful if they are not reliable for repeated trials. An animal trained for educational programming is not very useful if it cannot be counted on week after week for those programmes. In the domestic animal world the importance of reliability can be the difference between life and death. The animal that is used to detect bombs in a stadium needs to be as reliable in its ability to detect explosives two years after completing training as it was the week it completed training. The guide dog that assists its blind handler to navigate the world needs to be as skilled three years after training as it was one month after training. Behavioural reliability is often a key indicator of success in many organisations.
- Professional organisations: many people who train are bound by rules and guidelines put forth by professional associations and groups designed to manage a species or a breed of animal. These guidelines are often derived through compromises and discussions by many professionals with a wide range of skills, knowledge, and agendas.
- Public relations: sometimes organisations make choices based on appearances, and public perception. These are not usually scientifically based decisions, but they are important to most organisations and can have a huge impact on what choices are available to those who train animals.

Generally, we as humans are a compassionate species. We train animals in an attempt to give them better care and help them live in our world safely. The methods that we choose to use must be governed not only by efficacy but also by ethics. Just because we can train something doesn't mean that we should. One of the biggest factors that guides us in our decision about which training methods to use is our personal ethics. There are ethical guidelines laid down by our employers, by our profession, and by our peers, but as individuals we are also bound by our own ethical considerations and beliefs. Many wise trainers and scientists have used ethics and written about the importance of having an ethical framework to guide animal training in their decision making. Three of the most significant include:

- Least intrusive and minimally aversive (LIMA) principle (Lindsay 2005): Stephen Lindsay describes what he refers to as a cynopraxic (dog friendly) approach to training that is reinforcement based, but recognises that the need for aversive tools may at times be necessary. The LIMA principle advocates for a 'least intrusive and minimally aversive' approach to training. He emphasises that any ethical approach must be competency based, because it requires skill and experience to know when to use a more aversive approach. He also describes the dangerous effects of unnecessary escalation of utilising aversive tools.
- Hierarchy of effective procedures (Friedman 2009): Susan Friedman asks the question 'Is effectiveness enough?' Just because a tool gets the job done is that sufficient reason to use it? She concludes that it is not, nor should it be the only criteria in determining which methods to use. She proposes a hierarchy in which the use of punishers are a last resort, used only when

all other techniques have been tried and proven ineffective.
- LIEBI algorithm (O'Heare 2013): James O'Heare proposed a model that he labelled as a 'least intrusive effective behaviour intervention' algorithm. He refers to it as a best practices model that includes a decision-making algorithm with a 'levels of intrusion table' designed to help professionals work through the decision-making process of when to use aversive intervention. He describes a 'red zone' that involves a high degree of invasiveness and the goal of the procedure is to help professionals avoid ever getting to the red zone.

All three of these frameworks are similar but approach the problem from a different perspective.

Each of them acknowledges the science, but they also make a compelling argument for using the least intrusive methods first. They don't suggest that good trainers never use punishment, just that they use it wisely and avoid it whenever possible. These types of guidelines have been adopted by many leading training certification bodies for example: the Association of Animal Behaviour Professionals (O'Heare 2013), the International Association of Animal Behaviour Consultants (IAABC 2019), and the Certification Council for Professional Dog Trainers (CCPDT 2019).

4.8 A Personal Note, the Author's Approach: Balancing Ethics, Efficacy, and Best Practices

As my training style has evolved with experience, I have transitioned from a traditional approach to training, using corrections to teach impulse control during my early years as a guide dog trainer. Later, when I entered the zoo community, I was introduced to positive reinforcement training. There were certainly punishers and aversive stimuli in the environment, but they were not methods we regularly employed to shape behaviour. It became clear to me that punishment did not have to be a significant part of the training equation to be successful. That is not to say that minor aversive stimuli were not implemented from time to time to assist in shaping behaviour faster or making a concept clearer. But the use of those methods were rare and their use was restricted to more experienced trainers who had the skill to understand when and how to apply them.

We were positive reinforcement trainers who used mild aversive stimuli on very rare occasions. As I became a supervisor and was responsible for teaching new zoo professionals how to train, I was challenged with the question, 'Does being a positive reinforcement trainer mean that we never use punishment, ever?' This then led to the follow up question, 'and if we find ourselves needing to use an aversive tool or apply a punisher, does that mean we can no longer call ourselves positive reinforcement trainers?' These questions perplexed me until I read Friedman (2009). In this article, Friedman (2009) states that it is necessary that the method used to train aligns with your ethical beliefs. It showed me a clear path to determine when and why I might need to use something beyond positive reinforcement. As with most procedures, each trainer adapts them to fit their particular training style. My interpretation of the hierarchy as I teach it to young trainers is as follows, I always start at number 1 and move down the hierarchy only when needed:

1) *Animal needs come first*: animal welfare must always be a top priority. Therefore, before taking any training steps you should always assure that the animal is physically and mentally healthy and getting appropriate nutrition, housing, and care daily (see Figure 4.4).
2) *Include primary reasons for training in all decision making:* if it is determined that training is needed, always put the primary reasons for training before all others. The training must benefit the individual animal being trained by assuring that the

Figure 4.4 An example of how training animals in zoos can facilitate preventative and proactive veterinary care; here a bear has been trained for venepuncture whilst it stays in its enclosure. *Source:* Steve Martin.

training meets one of these goals and does not compromise the animal's welfare:
   a) physical exercise – gives the animal appropriate physical exercise;
   b) mental stimulation – provides appropriate mental stimulation;
   c) leads to cooperative behaviour – contributes to the safe management and care of the animal (medical behaviours, taking medication or vitamins, shifting, etc.).
3) *Set the environment up for success:* before embarking on a complex training plan, ensure the environment has been set up to make it easy for the animal to succeed in meeting desired behavioural goals.
4) *Use positive reinforcement:* once it is determined that training is desired, search for the best way to accomplish the goals using positive reinforcement. Remembering that the best reinforcement varies from individual to individual and from situation to situation.
5) *Use redirection:* if the animal is exhibiting unwanted behaviour, teach it something to do that is acceptable and will earn it reinforcement.
6) *Extinction may be used in conjunction with other tools:* if there is unacceptable behaviour, look for reinforcers that are strengthening or maintaining that unwanted behaviour and try to remove or withhold them.
7) *Negative reinforcement or negative punishment may be employed if absolutely needed:* when unwanted behaviour persists, review previous steps in the hierarchy and ensure that a positive alternative hasn't been overlooked, then use the method (negative reinforcement or negative punishment) that will likely achieve the desired result with the least fallout.
8) *Use positive punishment as a last resort:* if all else has failed, is impractical or is impossible and the undesirable behaviour must be stopped, apply a carefully thought-out positive punishment.

This hierarchy is not absolute, it is a guide. The wise application of these rules must be accompanied with skill and knowledge to assess when moving down the ladder is required.

4.9 Concluding Thoughts and Considerations

No matter the rhetoric or discussion regarding training methods used, it is unlikely that many professional trainers are purely all punishment based or all reinforcement based. Trainers must use a mix of methods to be effective and successful trainers. But not every method is equal nor is any method always effective!

Positive reinforcement training has become widespread because it has shown great effectiveness and success in achieving the needed goals in the modern zoo as well as in the modern domestic animal training world. Much of the challenge when choosing the right methods is mired in the confusion of terminology where the scientific meaning of reinforcement and punishment differs so greatly from the general public's understanding of these terms. Additionally, those who want to train animals are challenged with developing the mechanical skills to apply the methods properly and with the correct intensity. Finally, in animal training it is not possible to separate ethics and animal welfare from the equation when choosing the appropriate tools to use.

These considerations are required to make good choices and highlight the importance for all training programmes to have skilled leadership in the areas of behaviour, training, and enrichment and for programmes to have clear goals and guidelines to assist staff in making an informed decision.

No one training animals should make any training decision without being fully informed, and knowledgeable of the mechanisms that are at work when animals learn (animal learning theory, see Chapter 1). Only through a thorough knowledge of learning theory as underpinned by scientific research and an awareness of what practical applications have demonstrated, can the available options be compared and the appropriate choices for their animals and their programme be made. It is clear, starting a training programme using positive reinforcement is the most practical and effective approach. Applying other types of training methods, requires skill and a deeper understanding of the science, practical considerations, and ethics in each situation. The skilled trainer should find that the need to purposely use punishment in training is rare, but having full knowledge about the use of punishment and reinforcement will always be critically important in making an informed decision.

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