BIAZA Animal Training Guidelines

Preface

Jim Mackie
Chair - BIAZA Animal Behaviour and Training Working Group

These guidelines would not have been completed without significant contributions, editing and advice from many people. These include current and past members of the BIAZA Animal Behaviour and Training Working Group along with several other individuals, all of whom are cited at the end of this document.

A kind thanks to those who contributed images to this document (acknowledged by photograph)

This document contains Hyperlinks (text highlighted and underlined in BLUE and logos where indicated) that will take you to various documents online and also to sections within this document itself. Each section in the Table of Contents is also a hyperlink.

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Introduction to Animal Training

Animal training is being used with increasing frequency within BIAZA member Zoos and Aquariums and is an essential component of animal care and management. This document aims to provide practical guidance on how BIAZA members should approach animal training within their living collections.

It is advisable for an institution to produce a policy statement or guidelines, such as this document, to provide animal care staff with clear guidance of the processes that should be considered before, during and after training an animal. This guidance should include the institutional rationale for the use of training; the planning process required for each individual animal and/or behaviour trained; the acceptable techniques to train and maintain behaviour; the evaluation process and record keeping.

This overarching policy is called an ***Institutional Animal Training Policy*** and is designed to provide a coherent and consistent approach to training in a zoological collection. It is important to state that training is only one facet of the institution's behavioural husbandry/management programme.

Institutions could also have species-typical ***training programmes***, for example, a zoo that houses gorillas could have a training programme outlining trained behaviours that would be most beneficial to that species. For each behaviour trained there should be a bespoke ***training plan*** that accommodates each individual animal's circumstances***.***

BIAZA member institutions should be aware that BIAZA is an advisory member of the Animal Behaviour and Training Council (ABTC). The ABTC is the regulatory body representing animal trainers and behaviour specialists. It has set industry standards for knowledge and practical skills to ensure the meeting of both animal and human welfare needs (McBride & Montgomery, 2018). BIAZA is working toward becoming a practitioner member. Once achieved those involved in animal training within BIAZA member institutions should meet the required ABTC standards. The process is ongoing and BIAZA will keep members informed of any new developments.

ABTC
ANIMAL BEHAVIOUR & TRAINING COUNCIL

Click on the logo for the Animal Behaviour Training Council website

BIAZA member institutions must adhere to the government legislation on animal training in zoological collections which can be found in The Department for Rural Affairs' (DEFRA) Secretary of State Standards for Modern Zoo Practice (SSSMZP) (2012) in the UK and in the Department of Arts, Heritage and Gaeltacht (DAHG) Irish Standards of Modern Zoo Practice (ISMZP) 2016 in the Republic of Ireland.

One key criterion in both standards states:

"All [animal] training programmes should provide a net welfare benefit to the animal" (DEFRA, 2012, p.42); (DAHG ISMZP, 2016, p.50).

Click logo to open SSSMZP.

Click logo open ISMZP.

For examples of how to achieve a ***net welfare benefit*** to the individual animal see section – Why We Train Animals in Zoos and Aquariums.

A recent update of the SSSMZP in July 2017 included a new clause specifically for elephant management. For those collections housing elephants it is now a zoo licencing requirement to provide both an institutional training programme for elephants and a bespoke training plan for each individual elephant:

"Each institution must have an elephant training programme (documented in the [long term management plan] LTMP) and individual tailored goals for each animal (documented in the [individual welfare plan] IWP)" (DEFRA, 2017, p.10)

Click HERE to open Appendix 8 – Specialist Exhibits, Elephants.

The ISMZP includes special reference to the development of training programmes for elephants based on positive reinforcement to be supported by written protocols which clarify approved and non-approved training methods a9.8.43, a9.8.44 (DAHG, ISMZP, 2016, p. 67)

While this legislation currently only applies to elephants, it is likely that other species will follow in time, great apes for example. Therefore, it would be prudent to plan for the future by having both an institutional animal training policy, and also species-typical training programmes as an integrated part of any animal husbandry strategy.

BIAZA also supports the European Association for Zoos and Aquariums (EAZA) guidelines: (EAZA, 2014b, p.1.11.1) which state:

EAZA supports the training of animals for husbandry purposes provided that:

1. Only positive reinforcement techniques are used (i.e. rewards and never punishments) and the animals are never forced to take part in training.

2. The training goals are not detrimental to the welfare of the animal or its conspecifics.

3. The training process is regularly monitored and reviewed to ensure that the safety of staff and the welfare of the animals are maintained.

Click the logo to open EAZA Standards of Accommodation and of Animals in Zoos and Aquariums

In reference to Point 1 in the standards, BIAZA recognises that it is extremely difficult to create a training scenario where only positive reinforcement occurs, even if this is the intention of the trainer. However, it can be stated that in all training plans, ***Positive Reinforcement Techniques (PRT)*** should be the ***first considered and preferred*** approach and that punishment strategies should not be intentionally utilised. (See Appendix 2 - Alternative Strategies to Punishment).

Behavioural science shows that the two types of ***associative learning*** applied most successfully to animal training are operant and respondent learning, commonly known as operant training or conditioning and classical (Pavlovian) conditioning. (See Appendix 1 for Definitions). All animals learn through both operant (voluntary) and classical (reflex) conditioning. Operant training is used to teach new behaviours, however trainers should always be aware that classical conditioning will be occurring concurrently.

The most common procedure in zoos for teaching new behaviours through operant training is positive reinforcement training. PRT is an important training and management tool, the use of which is encouraged in zoos (DEFRA, 2012) as it has many benefits:

- PRT relies on voluntary participation giving the animal choice and control, enhancing welfare provision (Bloomsmith, Stone, & Laule, 1998)
- It can aid in management and veterinary procedures (Desmond & Laule, 1994)
- It is unlikely to harm the relationship between caregiver and animal (Innes & McBride, 2008)

- It can be a form of enrichment (Laule & Desmond, 1998), but should not be the sole source of enrichment (Hare & Sevenich, 2001).

It is important to remember that every interaction between an animal and a human is a learning experience. This is particularly relevant for animal caregivers who should aim to be consistent in the use of PRT methods in all of their interactions whether or not they are formal training scenarios.

Other forms of learning are also utilised in animal training programmes, notably habituation, desensitisation and counter conditioning (Domjan, 2015).

There are presently two areas of animal training in BIAZA zoos where other operant training methods are used alongside PRT. They are when training birds of prey using traditional falconry methods and when training elephants in a free contact setting.

There are guidelines in place for both of these scenarios:

For birds of prey (Habben & Parry-Jones, 2016) click HERE to open EAZA Falconiformes and Strigiformes Taxon Advisory Group - Husbandry and Management Guidelines For Demonstration Birds

For elephants (DEFRA, 2017) click HERE to open Appendix 8 – Specialist Exhibits, Elephants and refer to the current BIAZA Elephant Husbandry Guidelines.

NB: BIAZA recommends that all animal training in Zoos and aquaria should consider PRT as the first considered and preferred training method.

The Key Principles Underpinning All Animal Training

- All training should meet the **most positive, least intrusive** effective alternative for the individual animal concerned, where intrusiveness is defined as a continuum on which the animal has control over its own outcomes (Friedman and Haug, 2010).
- Every new behaviour should provide a net welfare benefit to the individual animal (DEFRA, 2012).
- Every training programme should be developed in a species appropriate fashion.
- Every training plan should consider the individual animal's needs and natural capability, both physical and behavioural.
- All training plans should be developed and written in advance, and show the series of steps to be taken towards reaching the target behaviour. However, the plan does not necessarily need to be detailed, as an important element of training is to read and respond to the animal's behaviour during training, which can potentially lead to a different path than the trainer had planned to follow.
- Motivation strategies should be carefully considered to ensure optimal welfare. If food is the chosen primary reinforcer, food deprivation or the use of the hunger state to elicit behaviour is not recommended.

"Many trainers already incorporate strategies that reduce or eliminate the need for weight management to create motivation for food. For example, birds can be trained immediately preceding normal meal times, meal times can be staggered throughout the day to increase training opportunities, base diets can be provided at all times while preferred foods are saved for reinforcers to be offered during training" (Heidenreich, 2014).

- The use of aversive, including physical, techniques, should be avoided and where used, the training plan should be reconsidered.
- The use of ***positive punishment*** (the process of decreasing behaviour by adding aversive stimuli), or negative punishment ("time outs") which remove the opportunity for the animal the receive reinforcement ***should be only rarely used and the program reconsidered*****.** This is equally true during acquisition (training) of a new behaviour and when a behaviour has been put on cue. Where an animal is either stuck during acquisition or later offers inappropriate behaviours, trainers should seek alternative ***positive reinforcement*** strategies instead (see Appendix 2 for recommendations).
- If individual animal welfare is in any way compromised during training the plan should be suspended and re-evaluated.
- All training should be planned, initiated, evaluated and recorded in a consistent manner appropriate to the record keeping policy (DEFRA, 2012; DAHG, ISMZP, 2016). BIAZA

ABTWG in conjunction with the Records Group have created planning and recording documents which are in line with ZIMS formatting.
Click here for the ZIMS planning doc (to be added when published on the BIAZA website)
Click here for the ZIMS record card (to be added - as above)

- It is recommended that an individual animal's training records should accompany it if it is moved to another institution, ideally with video showing the verbal and physical cues trained and the animal's response.
- It is recommended that as few people as possible, preferably one primary trainer, train an individual animal new behaviours to increase consistency across training sessions (Pryor, 2002; Minier et al., 2011). Trainers must work together to ensure consistency, including peer observation and constructive feedback. Others should become involved in maintaining the behaviour *only* when the animal is performing the behaviour reliably on cue.
- Training plans should offer animals a level of control through choice to facilitate their voluntary participation in training and ensure good welfare is maintained. E.g. through allowing animals to select training rewards, choice of trainer, timing or duration of training, considering the appropriateness of social segregation for training, considering whether it is appropriate to create unnecessarily high motivation states such as hunger to facilitate training etc. (Bacon, 2018)
- It is recommended that every institution should ensure that any staff who are going to be training animals should have a good understanding of behaviour science and learning theory and be assessed for practical skills competency (McBride & Montgomery, 2018). BIAZA is working in conjunction with the ABTC to provide a list of approved courses for the theoretical requirements.

Why We Train Animals in Zoos and Aquariums

Although there are many applications of animal training in zoos and aquariums, in reality there are only ***two*** reasons for training animals in zoos: Primary and Secondary (Ramirez, 1999).

Primary Applications of Training in Zoos and Aquariums

These reasons are ***for the animal*** - cooperative behaviours, social management and the psychological and physical wellbeing of the animal. Below are examples:

Improved Husbandry

PRT is used to assist animal caregivers in the daily task of managing animals in human care. Trained cooperative behaviours can be a viable alternative to traditional husbandry techniques. Training can improve welfare by reducing the stressors associated with management, for example box training for relocation instead of manual restraint (Savastano, Hanson, & McCann, 2003). Other useful "foundation behaviours" include targeting, stationing and recall/shifting.

Laughing kookaburra, *Dacelo novaeguineae*, participating in box training at Edinburgh Zoo. This foundation behaviour eliminates the need to manually handle animals for transport, and provides coping skills during relocation– Photo by Sarah Wright

Station training Spotted Whistling ducks, *Dendrocygna guttata,* at WWT Slimbridge Wetland Centre. Stationing allows multiple animals to be managed at the same time, for example to enable weighing or visual examinations – Photo by Kelli Inglis

Target training, in this example with an emperor tamarin, *Saguinus imperator*, at ZSL London Zoo can be used to separate individuals in large, mixed taxa exhibits, and is often the foundation that other behaviours are based on - Photo by Jim Mackie

Other applications include: weighing and moving animals between different parts of the enclosure to facilitate servicing.

Stationing on scales allows voluntary weight monitoring of a Cuscus, *Phalanger gymnotis*, at Edinburgh Zoo. This behavior has husbandry and veterinary applications – Photo by Sarah Wright

Medical Care

Animal caregivers use PRT to facilitate veterinary staff carry out a variety of procedures which would normally be achieved using manual restraint or sedation, providing a clear welfare benefit (Selvadurai, 2015). These procedures include vaccinations, anaesthetic injections, voluntary blood draws, physical examinations, urine collection.

Guinea Baboon, *Papio papio*, demonstrating an 'Open mouth' behaviour at Yorkshire Wildlife Park. This behaviour enables care givers and vets to inspect mouth and teeth which can negate the need for a general anesthetic - Photo By Sarah Blake

The range of behaviours and the variety of species trained for medical care and husbandry is continually being expanded and pushed forward.

Polar bear, *Ursus maritimus*, positioning his paw for an X-ray exam at Yorkshire Wildlife Park - Photo by Kim Wilkins

Enrichment and Increased Activity

PRT can be used to improve mental and physical condition by providing opportunities for an animal to engage in cognitive and physical activity. Additionally, the learning process itself can be highly stimulating for an animal and, once learnt, the behaviour can continue to be enriching due to the positive outcomes the animal experiences when responding to a cue. Once learnt, maintaining the behaviours on cue can be made more enriching by adding variety to the order in which these trained behaviours are requested (the behaviour sequences); varying the reinforcement offered and practising trained behaviours at different times of day.

Additionally, the organisation Shape of Enrichment supports the concept that training is enriching for the animals involved but concedes that;

> ***"An enrichment program consisting primarily of training opportunities is not a well-rounded program" (Hare & Sevenich, 2001, p.41).***

A Sumatran tiger, *Panthera tigris sumatrae*, responding to an audio recall at ZSL London Zoo. This trained behavior provides high intensity exercise and enrichment as part of a wider behavioural enrichment programme - photo by Sheila Smith

Behavioural Modification and Problem Solving

Behavioural functional assessments are used by behaviour specialists to identify how current antecedent and consequent conditions set the occasion for, and reinforce, problem behaviour such as aggression (e.g., lunging, biting) towards handlers. This information is then used to plan humane, pro welfare, behaviour modification plans of which PRT plays an integral part (Friedman, 2007; McBride, 2014; McBride & Montgomery, 2018). Friedman & Fritzler (2016) created an intervention hierarchy diagram (**See Figure 1 below**) that shows that PRT helps reduce undesirable behaviour and increase appropriate behaviours directly or through differential reinforcement. It is also clear that more intrusive procedures are ***not recommended*** and must be used with caution due to the resulting detrimental side effects associated with negative reinforcement, extinction and punishment (Friedman & Haug, 2010).

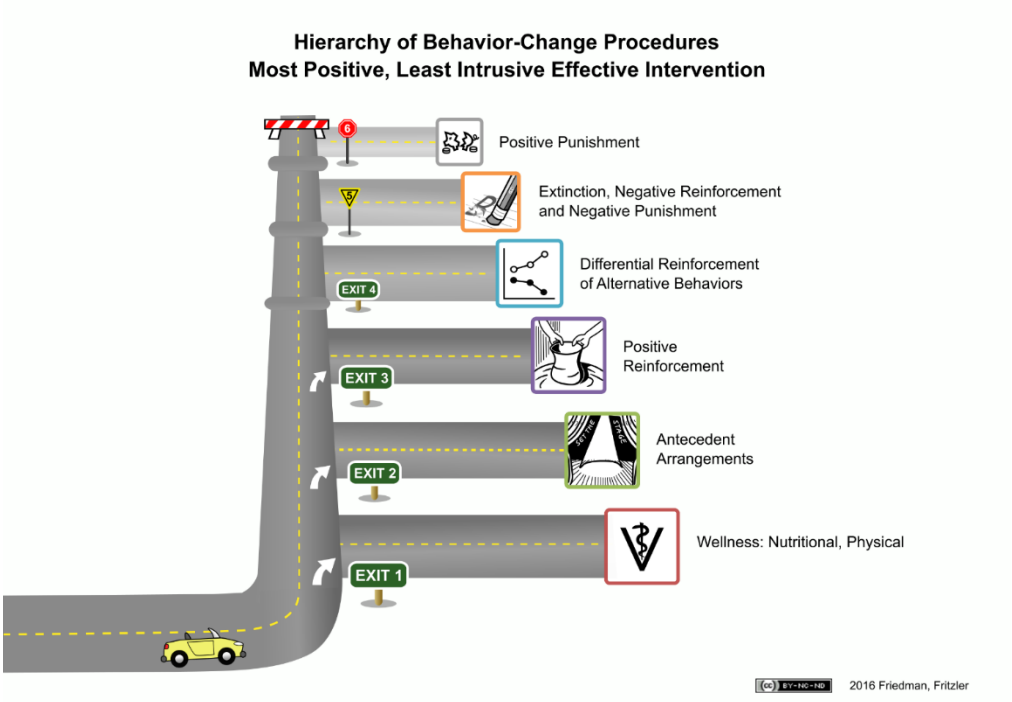

Figure 1: Behaviour intervention hierarchy (Friedman & Fritzler, 2016)

With reference to the inclusion of positive punishment in the above diagram, and to ensure that this is not misinterpreted as an endorsement of this strategy, here is a paragraph repeated from the main text of section two:

It is also clear that more intrusive procedures are not recommended and must be used with extreme caution due to the resulting detrimental side effects associated with negative reinforcement, extinction and punishment (Friedman, 2010).

Secondary Applications of Training in Zoos and Aquariums

These are ***not for the animal*** – the end result is to aid and assist human activity. Below are some examples:

Events

BIAZA is committed to educating zoo visitors and training animals can help its member zoos and aquariums to achieve this. Caregivers should use positive reinforcement training for both interactive programmes (see below) and to encourage natural behaviours both within the animal's enclosures and/or in a theatre or display setting. These shows enable visitors to understand how an animal is adapted to its natural environment and if trained adhering to best practice can be a highly enriching experience for the animal concerned.

African Harrier Hawk, *Polyboroides typus* at Banham Zoo. Training for shows can be a highly enriching experience but must provide a net welfare benefit to the individual – Photo by Pat Walker, provided by Andy Hallsworth

BIAZA supports the EAZA Guidelines on the use of animals in public demonstrations animal demonstrations (2014a) that state:

> ***"Training techniques used for demonstrations should not differ from day to day husbandry training techniques to guarantee animal welfare. Priority should also be placed on behavioural, environmental and social enrichment." (EAZA, 2014a, p.1)***
>
> ***Click here to open this document***

Human Interaction

Many zoos house a number of animals that are kept solely or partly for use in its interactive programmes. These include education sessions for school parties, zoo visitor encounters and commercial events. With regards to training, these encounters and experiences should follow the same guidelines as above and where available refer to species best practice guidelines.

Supporting Conservation/Research Programmes.

There is an increasing desire to use PRT to support conservation and research initiatives in zoological collections. While these are important projects, they must still fulfil the licencing requirement that, as with all animal training, there should be no compromise to animal welfare and the behaviours should **provide a net welfare benefit** to the individual animal.
One example of PRT supporting conservation research took place at ZSL London Zoo in 2016 when two Africa hunting dogs were trained to voluntarily accept a collar with a tracking device to test its viability before using in situ on wild counterparts (Harvey, 2017). The welfare benefit in this scenario included using enclosure modifications related to the training to facilitate husbandry and medical procedures which keepers were previously unable to do.

Two African hunting dogs*, Lycaon pictus*, at ZSL London Zoo. Radio tracking collars were attached through trained behaviour just before this picture was taken. Photo by Luke Harvey

Safe Working Practices:

Trained behaviours can support human health and safety. For example the use of an audio recall to shift animals from one part of an enclosure to another can allow safe access to enclosures. Additionally, the use of an emergency recall, especially with category one animals in open top enclosures, can provide one mitigation against visitor injury if the enclosure is breached.

Appendices

The following are provided as a quick reference. They are basic and limited definitions of classical/respondent and operant learning. Their inclusion in this document does not mean BIAZA supports the use of negative reinforcement or punishment as a training strategy.

Appendix 1

Classical conditioning (AKA respondent and Pavlovian conditioning)

The procedure of pairing a neutral stimulus with an unconditioned (or previously conditioned) stimulus, i.e., stimulus-stimulus pairing. The result is a new antecedent trigger (elicitor) for reflex responses such as salivation, pupillary dilation, hackles raised. Classical conditioning accounts for innate, emotional reactions such as fear responses to the veterinarian who has been paired previously with restraint and pain. Classical conditioning also accounts for the innate appetitive reactions to particular keeper's in their green shirts, which has been previously paired with food. This is passive learning where the antecedent trigger can be said to cause the reflex response. Consequences don't influence these behaviours.
The animal is not learning a new behaviour, but will respond in a reflexive way to the stimuli. A neutral stimulus initially incapable of eliciting reflexive responses (behaviours) acquires the ability to do so through repeated pairing with other stimuli that can elicit such responses. This type of conditioning does not involve any voluntary choices by the animal and is described as "stimulus-response" relations as the behaviour is automatically triggered by the stimulus.

Operant training

The animal learns the association between its actions (behaviour) and the consequences. There are two main types of consequences – Reinforcing (strengthening) and Punishing (weakening).

*Behaviour is **strengthened** if followed by the addition of a stimulus the animal desires (known as positive reinforcement) or the removal of a stimulus the animal does not desire (negative reinforcement)*.

*Behaviour is **weakened** if followed by the addition of a stimulus the animal does not desire (positive punishment) or the removal of a stimulus the animal desires (negative punishment)*

Figure 2 below shows a table illustrating the relationship between the consequences and the resulting effect on the behaviour.

	Reinforcement (behaviour increases)	**Punishment** (behaviour decreases)
Positive *(meaning adding something)*	***Positive Reinforcement* R+** Something 'desirable' is added	***Positive Punishment* P+** Something 'undesirable' is added
Negative *(meaning removing something)*	***Negative Reinforcement* R-** Something 'undesirable' is removed	***Negative Punishment* P-** Something 'desirable' is removed

Figure 2: Operant Training Quadrants

The animal learns which behaviours enable it to best succeed at gaining reinforcement, either acquiring pleasant, desired stimuli or avoiding unpleasant stimuli. Thus, the animal "operates" on the environment, leading to the desired outcome. This type of learning is described as "response-stimulus" relations as the consequent stimulus drives future behaviour. With operant behaviour, the antecedent stimulus is not a cause but rather a signal (cue) for the behaviour-consequence contingency ahead. For example, if the shift door opens (antecedent cue), and the animal moves into the enclosure (behaviour), then food follows (consequence).

Generally speaking, animal training in zoos relies on the use of PRT, which is one component of operant learning theory. Put simply, operant conditioning involves voluntary choices by the animal and classical involves reflex responses. With PRT a trainer may start by using a technique such as luring or shaping to evoke behaviour, then once the animal is competently performing the behaviour the trainer then places the behaviour under stimulus control by inserting an antecedent stimulus such as a verbal cue. Its then up to the animal whether or not to choose to perform the behaviour when the trainer asks for it. If it does the behaviour correctly, the trainer should reinforce that behaviour with something the animal likes, often a favourite food item.

For further information on Classical, Operant and other forms of learning see e.g. Pearce, 2008 or Domjan, 2015.

Appendix 2 - Alternatives to Positive Punishment

- If an animal exhibits an undesired behaviour this can be for a variety of reasons, which may require further consideration (see Appendix 2). It is not appropriate to use positive punishment as this may exacerbate the problem by increasing fear or frustration in the animal. This can have immediate and delayed consequences of reducing the animal's welfare and safety of staff (McBride & Montgomery, 2018). Additionally, the known side effects of punishment-based procedures include increased aggression, generalized fear, apathy, and escape/avoidance behaviors (Friedman & Haug, 2010).
  Instead of punishment, the trainer should ask the animal to demonstrate an alternative behaviour. This behavior reduction technique is the combination of reinforcement for the alternative behavior and extinction for the problem behavior and is known as differential reinforcement (DRAlternative/DRIncompatible/DROther). Differential reinforcement of alternative behavior, can be one of the most useful tools of any trainer (Ramirez, 1999) and is designed to allow the trainer to ask the animal to replace the undesired behavior with a behaviour it knows well to earn reinforcement (Chance, 1999; Kazdin, 1994). This serves to maintain a relaxed interaction.
- If an animal fails to respond to a cue during a training session, some trainers will use "Time Outs" (definition – negative punishment - removal of opportunity for reinforcement, (Kazdin, 1994)).

A 'Time-Out' can be a relatively un-intrusive behavior change procedure if it is implemented correctly, i.e., consistently, with close contiguity (immediacy) to the problem behavior, and short duration of just a few seconds. The animal should be quickly brought back into the situation and given a chance to do the right behavior and earn positive reinforcement" (Friedman and Haug, 2010)

- However, 'Time Outs' can be demotivating for the animal who may become frustrated and aggressive, or choose to disengage from the training session, especially if used incorrectly by an inexperienced trainer. An alternative strategy is the Least Reinforcing Scenario (LRS). This can be utilised ***once the animal has mastered a behavior*** and it is under stimulus control, if the animal fails to respond to the cue during a training session. With LRS, given an incorrect response to a cue, the trainer withholds reinforcement for a short duration (3 seconds or less depending on the individual animal), and if the animal remains calm and attentive to the trainer, reinforcement follows as illustrated in **Figure 3** below.

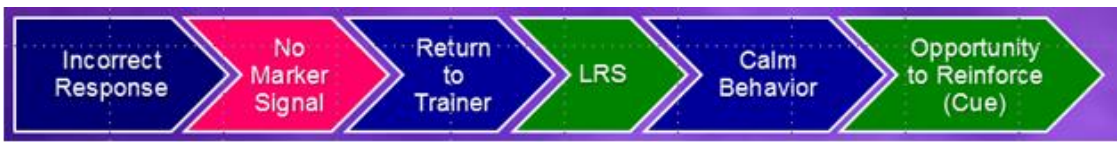

Figure 2: Least Reinforcing Sequence (Scarpuzzi et al., 1991).

Glossary – Animal Training Definitions from the American AZA/AAZK

The following list of training terms and definitions has been developed in an effort to promote accurate use of technical terminology and to facilitate clear communication among zoo and aquarium professionals. The list is not exhaustive, but will hopefully provide a basic understanding of commonly used training terms. Where possible, the technical definition (developed by the scientific community with the goal of precise communication) is listed. Some commonly-used terms do not have a technical definition. Others are commonly used in ways that diverge from their technical definitions. Where this is the case, we have distinguished between technical definitions and common use, and provided examples in an effort to add clarity.

Abolishing Operation (AO) – (Technical definition) A motivating operation that decreases the reinforcing effectiveness of a stimulus, object, or event. For example, the reinforcing effectiveness of food may be abolished as a result of food ingestion (Cooper, Heron, and Heward, 2007).

Example:

A lion's favorite reinforcer is goats' milk. The trainer wants the lion to come off exhibit in the evening and plans to reinforce this with goats' milk. If the lion has access to goats' milk all day, this reinforcer will lose value (the reinforcer value will be abolished) and the lion will be less likely to respond in order to obtain it. This is also called satiation. Abolishing operations can also involve stimuli other than the reinforcer. For example, if the lion did not have access to goats' milk during the day but was on an antibiotic that caused nausea, this might also abolish the reinforcing value of goats' milk.

Approximation –

Common use:

One small step in a series of progressive steps that leads to the behavioral goal; see **Shaping by Successive Approximations**.

Baiting/Luring –

Common use:

The process of placing a reinforcer in a particular location and then reinforcing an animal's movement to that location.

Example:

A trainer places food on a scale to encourage a deer to approach the scale.

Behavioral Criterion –

Common use:

The level of behavioral response that must be met to earn reinforcement; determines the "correct" response.

Example:

A trainer is teaching a bald ibis to station during feeding. At first, the behavioral criterion (correct response) is set at 2 seconds of stationing. As training continues, the behavioral criterion is gradually raised so that eventually the correct response is stationing for 30 seconds. In addition to a time element, a behavioral criterion may also include a physical element. For example, stationing for 30 seconds would require the ibis to remain within certain boundaries during that time.

Bridging Stimulus –

Common use:

An informative stimulus (sometimes called a marker signal) that pinpoints the exact moment that the behavioral criterion (for that approximation) is met. The "bridge", as it is often called, (often a clicker, whistle or word) communicates to the subject that it has performed correctly and signals that additional reinforcement is on the way. It "bridges" the gap between the time the correct response is given and the time the reinforcer is delivered.

Capture –

Common use:

The process of reinforcing a behavior as it spontaneously occurs. Sometimes called scanning.

Example:

A trainer waits for a gorilla to urinate and then bridges

Classical Conditioning – (Technical definition) Procedure of pairing an unconditioned stimulus (US, which already elicits a response) with a neutral stimulus (which initially does not elicit a response) (Chance, 1999). Through repeated pairing, the neutral stimulus becomes a conditioned stimulus (CS) and elicits the same response as the unconditioned stimulus. Also called Pavlovian or respondent conditioning. (**See example under "Conditioned stimulus".)** It is important to remember that, in classical conditioning, the CS and US are presented regardless of what the animal does, and that the behavior involved is a reflex (e.g., blinking or salivating) and not dependent on operant learning.

Example:

Cat owners who feed their cat's canned food and use an electric can opener know that just the sound of the opener will cause the cat to come running into the kitchen and salivate. The sound of the opener (an originally neutral stimulus) is paired with food (a stimulus that elicits a reflexive response such as salivation) until the sound alone elicits the response. This occurs because the sound of the electric opener reliably predicts the presence of food.

Conditioned Stimulus (CS) – (Technical definition) is a formerly neutral stimulus that elicits respondent behavior only after it has been paired with an unconditioned stimulus (US) or another CS. (Cooper, Heron, and Heward, 2007).

Example:

When a clicker (neutral stimulus) is repeatedly paired with food delivery (US), the clicker eventually becomes a CS. The CS then elicits a conditioned response that is often similar to the unconditioned response (e.g., salivation, mouth open, etc.) elicited by the US.

Contingency – **(Technical definition)** A dependency between events (Chance, 1999). Reinforcement is contingent on behavior if it is delivered only after the behavior occurs.

Continuous Reinforcement – (Technical definition) a reinforcement schedule in which a correct response is reinforced each time it occurs. Abbreviated CRF. (Chance, 1999).

Counterconditioning – (Technical definition) is the use of Pavlovian conditioning to reverse the unwanted effects of prior conditioning (Chance, 1999).

Common use:

A desensitization procedure in which an aversive stimulus is explicitly paired with positive reinforcement.

Example:

An animal can be conditioned to accept a needle (aversive stimulus) for routine vaccinations by associating it with positive reinforcer (food).

Cue – See "S^D".

Desensitization - (Technical definition) the process of reducing the effects of an aversive event through repeated exposure, or habituation (opposite of sensitization, Chance, 1999).

Common use:

Desensitization can take two forms. In habituation, learning occurs through passive exposure to an aversive stimulus over time. In counterconditioning, the aversive stimulus is explicitly paired with positive reinforcement. Desensitization often involves fading in the aversive stimulus gradually, or systematically.

Example:

See Counterconditioning and Habituation.

Discrete Trial Procedure – **(Technical definition)** an operant training procedure in which performance of a response defines the end of a trial (Chance, 1999). Trials are separated by inter-trial intervals.

Example:

A trainer is teaching a zebra to present his foot for a hoof trim. A trial begins when the trainer gives a cue ("hoof"), and ends when the zebra makes a (correct or incorrect) response and the trainer delivers a consequence. An inter-trial interval then takes place before the next trial, which begins when the trainer gives another cue. During the inter-trial interval, reinforcement is not available. If the zebra presents his hoof during this time, a reinforcer will not be delivered. Often this inter-trial interval is very short (no more than a second or two) and may be just long enough for the animal to consume an edible

reinforcer. The inter-trial interval restricts the rate of responding, so the same schedule of reinforcement will have different effects in a discrete trial procedure than in a free operant procedure. Most husbandry training involves discrete trial procedures.

Discriminative Stimulus – See "S^D".

Environmental manipulation –

Common use:

The process of changing elements of the environment to approximate a desired response and then pairing that change with reinforcement.

Example:

A trainer might deliver a reinforcer while touching an animal with a target.

Extinction – (Technical definition) in classical conditioning is the procedure of repeatedly presenting the CS without the US. In operant learning, the procedure of withholding reinforcers that maintain a response (Chance, 1999).

Extinction Burst - (Technical definition) an increase in the frequency of responding when an extinction procedure is initially implemented (Cooper, Heron, and Heward 2007).

Fixed Interval Schedule – (Technical definition) An intermittent schedule of reinforcement in which reinforcement is delivered for the first correct response emitted following the passage of a fixed duration of time since the last response was reinforced (Cooper, Heron, and Heward, 2007).

Example:

On an FI 3-minute schedule, the first correct response following the passage of three minutes is reinforced. FI schedules typically produce a scalloped response pattern, in which responding slowly accelerates and reaches a maximum right before a reinforcer is delivered. The animal then pauses before repeating the pattern. For example, we could set an automatic feeder to deliver food to a warthog once an hour after a nose poke. In this case, the warthog will poke the feeder more and more towards the end of each hour until the food is dispensed, then pause and slowly start to poke again, repeating the pattern. Note that interval schedules apply differently in discrete trial procedures vs. free operant procedures.

Fixed Ratio Schedule – (Technical definition) an intermittent schedule of reinforcement requiring a fixed number of correct responses for reinforcement (Cooper, Heron, and Heward, 2007).

Example:

On an FR-4 schedule, reinforcement follows every fourth correct response. FR schedules typically produce rapid responding followed by a post-reinforcement pause. The more responses required for each reinforcer, the longer the pause will be. These schedules can be useful when we want to produce a certain number of responses quickly and we don't mind a pause following the reinforcer delivery. For example, a goat might be trained to pick up plastic bottles and deposit them in a recycling bin. A trainer delivers an edible reinforcer following every fourth deposit. An FR schedule produces different effects in free operant vs. discrete trial procedures.

Fixed Time Schedule – (Technical definition) A schedule for the non-contingent delivery of stimuli, in which a time interval remains the same from one delivery to the next (Cooper, Heron, and Heward, 2007).

Example:

If food is delivered at 9:00 and 3:00 each day regardless of what the animal does, this would be a fixed time schedule. Time-based schedules (fixed-time and variable-time) can be used to decrease undesirable behavior by enriching the environment so that the animal does not need to engage in undesirable behavior to access reinforcers.

Free Operant Procedure – **(Technical definition)** an operant training procedure in which a response may be repeated any number of times (Chance, 1999).

Example:

Often, free-operant procedures resemble more natural situations. For example, when a baby mandrill latches onto its mother it will receive milk and other physiological reinforcers. In this example, there is a cue (the mother's presence) and the response can happen many times in quick succession (the baby doesn't have to wait for the next "trial" to start).

Generalization – (Technical definition) the tendency for a learned response to occur in the presence of stimuli that were not present during training (Chance, 1999).

Example:

After learning to allow a series of specific people to touch him, eventually an animal will let all people pet him, even if they are strangers.

Habituation – (Technical definition) A decrease in the intensity or probability of a reflex response as the result of repeated exposure to a stimulus that elicits that response (Chance, 1999).

Common use:

A form of desensitization; the process of gradually getting an animal used to a situation that it normally reacts to, (i.e. avoids or reacts adversely to) by prolonged or repeated exposure to that situation.

Incompatible Behavior –

Common use:

A behavior that is impossible to perform at the same time as another specific behavior.

Example:

Laying down is incompatible with jumping at a door.

Intermittent Schedule of Reinforcement (INT) – (Technical definition) A schedule of reinforcement in which some, but not all, occurrences of the behavior produce reinforcement (Cooper, Heron, and Heward, 2007). Any schedule of reinforcement that is not continuous (i.e. variable ratio, variable interval, fixed ratio, fixed interval).

Jackpot or Bonus –

Common use:

Delivery of a larger or more valued than usual reinforcer.

Least Reinforcing Scenario (LRS) –

Common use:

Following an incorrect response from the animal, the trainer pauses for a brief (~3 seconds) period during which no reinforcement is available. The trainer then delivers a cue, thereby providing the next opportunity for the animal to earn reinforcement.

Limited Hold – (Technical definition) A situation in which reinforcement is available only during a finite time following the lapse of an FI or VI interval; if the target response does not occur within the time limit, reinforcement is withheld and a new interval begins (Cooper, Heron, and Heward, 2007).

Common use:

A window of opportunity during which reinforcement for the correct response is available.

Example:

On an FI 5-minute schedule with a limited hold of 30 seconds, the first correct response following the passage of 5 minutes is reinforced only if that response occurs within 30 seconds after the end of the 5-minute interval.

Magnitude of Reinforcement – (Technical definition) the amount or duration of a reinforcer (Fisher, Piazza, and Roane, 2011).

Maintenance – **(Technical definition)** Continuing to exhibit previously learned skills (Fisher, Piazza, and Roane, 2011).

Moulding –

Common use: The process of physically moving an animal's body into a desired position and then pairing that movement with reinforcement.

Motivating Operation (MO) – (Technical definition) an environmental variable that (a) alters (increases or decreases) the reinforcing effectiveness of some stimulus, object, or event; and (b) alters (increases or decreases) the current frequency of all behaviors that have been reinforced by that stimulus, object, or event (Cooper, Heron, and Heward, 2007).

Example:

Some medications may increase the reinforcing effectiveness of food, while others may decrease it.

Negative Punishment – (Technical definition) A behavior is followed immediately by the removal of a stimulus (or a decrease in the intensity of the stimulus), that decreases the future frequency of similar behaviors under similar conditions (Cooper, Heron, and Heward, 2007).

Example:

When a child "talks back" to his/her mother, the child may lose the privilege of watching his/her favorite television program. If the loss of viewing privileges decreases the likelihood of the child talking back in the future it acts as a negative punisher.

Negative Reinforcement – (Technical definition) Occurs when a behavior is followed by the removal of, or a decrease in the intensity of, an aversive stimulus, resulting in a decrease in the future frequency of similar behaviors under similar conditions (Chance, 1999).

Example:

When an animal is restrained firmly for a medical exam, the keeper handling the animal may relax his firm hold if the animal quits struggling. The decrease in intensity of the firm hold (presumably aversive to the animal) negatively reinforces the desired behavior of relaxing and ceasing to struggle.

Observational Learning – (Technical definition) Learning based on observing the responding of another organism (and/or its consequences) (Catania, 1998).

Operant Conditioning – (Technical definition) The basic process by which operant learning occurs; consequences (stimulus changes immediately following responses) result in an increased (reinforcement) or decreased (punishment) frequency of the same type of behavior under similar motivational and environmental conditions in the future (Cooper, Heron, and Heward, 2007).

Example:

An animal learns that when a keeper is present, close proximity to the keeper is often followed by delivery of preferred edible items. The animal is likely to move into close proximity with the keeper in the future when the opportunity arises. Note that operant learning can take place in unintended/accidental situations as well as those that are purposely arranged.

Positive Punishment – (Technical definition) a behavior is followed immediately by the presentation of a stimulus that decreases the future frequency of similar behaviors under similar conditions (Cooper, Heron, and Heward, 2007).

Example:

If a trainer is petting a cat's fur in a way that the cat finds unpleasant, the cat may attempt to bite the trainer. If the cat's bite decreases the likelihood that the trainer will pet the cat in that same way in the future, it acts as a positive punisher.

Positive Reinforcement – (Technical definition) Occurs when a behavior is followed immediately by the presentation of a stimulus that increases the future frequency of similar behaviors under similar conditions (Cooper, Heron, and Heward, 2007).

Example:

A trainer presents a target a few inches in front of a komodo dragon. When the dragon touches the target, the trainer delivers a preferred edible item. If the delivery of the edible item increases the likelihood that the dragon will touch the target when it is presented in the future, the edible item acts as a positive reinforce.

Primary Reinforcer or Unconditioned Reinforcer – (Technical definition) A reinforcer the effectiveness of which does not depend on its contingent relation to another reinforcer (Catania, 1998).

Example:

Biological needs: food, water, warmth, sex.

Prompt – (Technical definition) Supplementary antecedent stimuli used to occasion a correct response in the presence of an S^D that will eventually control the behavior. The three major forms of response prompts are verbal instructions, modeling, and physical guidance (Cooper, Heron, and Heward, 2007).

Example:

When initially shaping a laydown behavior, the trainer models the behavior by squatting down to encourage the correct response.

Punisher – (Technical definition) a stimulus change that decreases the future frequency of a behavior that immediately precedes it (Cooper, Heron, and Heward, 2007).

Regression – (Technical definition) the reappearance of previously extinguished behavior during the extinction of more recently reinforced behavior. Also called resurgence. (Catania, 1998).

Common use:

The state of a conditioned behavior reverting back to a previous stage in the learning process.

Example:

A trainer is teaching a vulture to station during feeding. At an earlier stage in training, the trainer extinguished wing-flapping behavior during feeding by delivering food only when wing-flapping did not occur. Now the trainer is attempting to extinguish stepping off of the station by delivering food only when both of the vulture's feet are on the station. The vulture now starts to exhibit the previously-extinguished wing-flapping behavior.

Reinforcer – (Technical definition) a stimulus change that increases the future frequency of a behavior that immediately precedes it (Cooper, Heron, and Heward, 2007).

Satiation – **(Technical definition)** Continued presentation or availability of a reinforcer that reduces its effectiveness (Catania, 1998).

Example:

Animal receives 5lbs of chicken during a training session instead of the normal 1 lb. The animal will not train for several hours after. The value of chicken as a reinforcer has been reduced.

Schedules of Reinforcement – (Technical definition) A rule specifying the environmental arrangements and response requirements for reinforcement; a description of a contingency of reinforcement (Cooper, Heron, and Heward, 2007). See continuous reinforcement and intermittent reinforcement.

Secondary Reinforcer or Conditioned Reinforcer – (Technical definition) any reinforcer that has acquired its reinforcing properties through its association with other reinforcers (Chance, 1999).

Example:

Proximity to, or contact with, keepers may become a conditioned reinforcer through association with other reinforcers such as food, preferred areas, tactile stimulation, etc.

S^D (Discriminative Stimulus) or Cue – (Technical definition) A stimulus in the presence of which responses of some type have been reinforced and in the absence of which the same type of responses have not been reinforced; this history of differential reinforcement is the reason an S^D increases the momentary frequency of the behavior (Cooper, Heron, and Heward, 2007). *

S^{Δ} (Stimulus Delta) – **(Technical definition)** A stimulus in the presence of which a given behavior has not produced reinforcement in the past (Cooper, Heron, and Heward, 2007). *****

Selective or Differential reinforcement – (Technical definition) any operant training procedure in which certain kinds of behavior are systematically reinforced and others are not (Chance, 1999).

Shaping by Successive Approximations – (Technical definition) gradually modifying some property of responding by differentially reinforcing successive approximations to a goal behavior. Shaping is used to produce responses that might not otherwise be emitted or might be emitted only after a considerable time. The variability of the responding that follows reinforcement usually provides opportunities for reinforcing further responses that still more closely approximate the criteria that define the goal behavior (Catania, 1998). (**Example**) A trainer wants to train a bird to step on a scale. They place the scale in the bird's enclosure and reinforce any movement the bird makes towards the scale. Each step is reinforced:, step toward, touch with one foot, touch with beak, two feet on scale, etc., with the criterion for reinforcement increasing with each new step until the final behavior is reached.

Station – **(Technical definition)** an assigned position for an animal, designated by a trainer (Ramirez, 1999).

Stimulus – (Technical definition) any environmental event that affects, or is capable of affecting, behavior (Chance, 1999).

Stimulus Control – (Technical definition) the discriminative control of behavior, in which a response occurs in the presence of an S^{D} but not in the presence of an S^{Δ} (Chance, 1999).

Common use:

A behavior under stimulus control is said to be "on cue".

Stimulus Delta – See "S^{Δ}".

Strength – **(Technical definition**) the resistance of behavior to change (e.g., resistance to extinction, to disruption by added stimuli and/or to effects of reinforcing alternative responses) (Catania, 1998).

Superstitious Behavior – (Technical definition) the modification or maintenance of behavior by accidental relations between responses and reinforcers (Catania, 1998).

Example:

A pigeon turned counter-clockwise in the cage just before a reward was presented, which led the pigeon to learn an association between the counter-clockwise turn and food even though the counter-clockwise turn was not required to obtain the reward.

Target –

Common use:

An object that pinpoints a specific location for an animal.

Example:

A pool float or buoy is commonly used as a target in animal training.

Targeting –

Common use:

Teaching an animal to touch some part of its body to another object (Ramirez, 1999).

Time-out – (Technical definition) the contingent withdrawal of the opportunity to earn positive reinforcement or the loss of access to positive reinforcers for a specified time; a form of negative punishment (Cooper, Heron, and Heward, 2007).

Example:

A trainer gives a cue for an animal to lay down. The animal does not respond. The trainer leaves the area for a minute, thereby removing the opportunity for the animal to receive reinforcement from the trainer. The trainer returns and continues the session, providing further opportunities for the animal to receive reinforcement from the trainer.

Unconditioned Stimulus (US) – (Technical definition) A stimulus that elicits an unconditioned response (Chance, 1999). Effective USs in respondent conditioning are often effective positive or negative reinforcers in operant conditioning (Catania, 1998).

Example:

When a clicker (neutral stimulus) is repeatedly contingently paired with food delivery (unconditioned stimulus), the clicker eventually becomes a conditioned stimulus.

Variable Interval Schedule – (Technical definition) an intermittent schedule of reinforcement in which reinforcement is delivered after the first correct response following the passage of variable durations of time occurring in an unpredictable order. The mean duration of the intervals is used to describe the schedule (Cooper, Heron, and Heward, 2007).

Example:

On a VI 10-minute schedule, reinforcement is delivered for the first correct response following an average of 10 minutes since the last reinforced response, but the time that elapses following the last reinforced response might range from 30 seconds or less to 25 minutes or more. For example, we could set an automatic feeder to deliver food to a warthog when she pokes a button with her nose an average of every 10 minutes after the last nose poke. Sometimes the food might be available 30 seconds after the last nose poke, and sometimes the warthog will have to wait 25 minutes or more. In this case, the warthog will poke the feeder at a slow and steady rate, with few pauses. The longer the average interval, the slower the rate of nose poking will be. Because the intervals are variable, this schedule will produce high resistance to extinction. Note that interval schedules apply differently in discrete trial procedures vs. free operant procedures.

Variable Ratio Schedule – (Technical definition) an intermittent schedule of reinforcement in which reinforcement is delivered after a varying number of correct responses. The mean number of responses required for reinforcement is used to describe the schedule (Cooper, Heron, and Heward, 2007).

Example:

On a VR-10 schedule, an average of 10 responses must be emitted for reinforcement, but the number of responses required following the last reinforced response might range from 1 to 30 or more. VR schedules typically produce steady, high rates of responding in a free operant procedure, and high resistance to extinction in both free operant and discrete trial procedures. This type of schedule occurs frequently in nature and might be particularly useful when we want to train an animal to succeed under natural contingencies. For example, we might train a baby mandrill to climb up and cling in order to access milk. In nature, the baby will probably need to persist in this response in order to nurse successfully, so we may use a variable-ratio schedule during training to promote persistence so that the baby will be more likely to succeed under natural contingencies.

Variable Time Schedule – (Technical definition) A schedule for the non-contingent delivery of stimuli, in which the interval of time from one delivery to the next varies (Cooper, Heron, and Heward, 2007).

Example:

On a VT 1-minute schedule, the delivery-to-delivery-interval might range from 5 seconds to 2 minutes, but the average interval would be 1 minute. Time-based schedules (fixed-time and variable-time) can be used to decrease undesirable behavior by enriching the environment so that the animal does not need to engage in undesirable behavior to access reinforcers.

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BIAZA Animal Behaviour and Training Working Group
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Jim Mackie - Chair (ZSL)
Kris Hern - Vice chair (Twycross Zoo)
Chirag Patel - Scientific advisor (Consultant)
Mark Kingston Jones - Enrichment advisor (Shape of Enrichment UK)
Jo Mason - Education advisor (Bicton College)
Rowena Killick - Veterinary advisor (Bristol Zoo)
Ross Brown - Bird Liaison Officer (Marwell Zoo)
Heather Williams - Aquarium Liaison Officer (National Marine Aquarium)
Graham Hill - Aquarium Liaison Officer (The Deep)
Adam Davis - Herptile Liaison Officer (Bristol Zoo)
Kim Wilkins - Mammal Liaison Officer (Yorkshire wildlife Park)
Holly Farmer Quinlan - Welfare liaison Officer (Paignton Zoo)
Danielle Free - Research liaison Officer (Marwell Zoo)