AZA/AAZK Animal Training Terms & Definitions

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 and reinforces the behavior.

Classical Conditioning – (Technical definition) The 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 cats 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) 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) 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, 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). **(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. **(Common use)** A window of opportunity during which reinforcement for the correct response is available.

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).

Molding – (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 reinforcer.

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). **(Examples)** 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 5 lbs 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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