

An introduction to positive reinforcement and “mark and reinforce” (aka clicker) training

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Intended learning objectives:

By the end of this session, it is hoped that participants will be able to:

- Understand principles of positive reinforcement training
- Articulate ethics in animal training
- Understand basic concepts in applied behaviour analysis
- Apply basic animal training techniques
- Appreciate that training is always in the context of the individual and species' needs
- Build confidence in how to start and progress basic training: observe, mark, reinforce

Introduction:

Becoming good observers of behaviour, being clear about our criteria, and training kindly and efficiently will set us up for success in teaching animals. Positive reinforcement (R+) training fits the bill, and should be an ethical, minimally intrusive animal training method, and thus our first-choice training tool. It involves providing the [animal] learner with something they desire as “payment” for a desired behaviour, which we would like to be repeated.

There are many ways to use positive reinforcement training, including classical conditioning (“this predicts that”) and counterconditioning (changing a conditioned emotional response), as well as operant conditioning (the learner chooses to behave to gain desired outcomes or avoid aversive ones). Examples of positive reinforcement training techniques include luring with food/a toy; pairing stimuli with a reinforcer; distracting/redirection with food/a toy; and marking and rewarding desired behaviours that the animal chooses to do (e.g., using capturing, shaping, targeting, or a combination). Operant teaching involves producing the reinforcer *as* the behaviour being trained occurs; and luring, when the reinforcer is produced in advance to *induce* the behaviour. Many methods can be skilfully used in combination, for a multitude of applications.

Why Positive Reinforcement Training?

In companion animals, positive reinforcement training has numerous potential possibilities. Particularly mark-and-reward training (more on this later), which becomes a clear system of communication that creates a respectful (and often joyful) dialogue between the human teacher and the animal learner. It is widely used to:

- *Build relationships* - training with animals is bonding, and creates empathetic and respectful human-animal relationships. It is fun, opens up communication channels, creates trust, allows the learner choice and control

over how training proceeds. The learning is bilateral – with the animal being as much a leader and teacher as the trainer.

- *Provide mental stimulation, so-called enrichment and fun* - this can allow outlets for natural behaviours; provides problem-solving opportunities; adds positive experiences to an animal's life; builds confidence; and can help to replace undesirable behaviours (many of which occur as a result of natural behaviour being thwarted due to living in a confined environment) with human-acceptable ones (known as response substitution).
- *Proactively prepare animals for changes or inevitable life events or care interventions* - for example grooming, husbandry or veterinary procedures, as well as changes to the household dynamic, such as new partners, babies, changes of and to homes, etc.
- *Teach so-called manners, tasks and human-acceptable behaviour* - enabling animals to be successful in human-controlled environments, and to understand what is expected of them in a given situation. E.g., come when called, go-to-place, toilet training, etc. This not only build the animal's confidence, and strengthens the human-animal bond, but reduces the risk of use of punishment.
- *"Install life skills", and build confidence, resilience and problem-solving abilities* - this can help create happy, independent animals who learn to cope with their environment more successfully.
- *Change problem behaviours* – e.g., those which are a problem for the animal, the human caregivers +/- the other pets in the environment. This may involve collaborative input from behaviourists and veterinary professionals to help treat behaviour concerns, so as to preserve and improve welfare and safety.
- *Improve welfare* - for all of the above reasons. Training is often overlooked, or professional help is only sought in the face of a problem, but ideally training should be considered an essential quality-of-life-enhancing factor that should be proactively planned for in all pet or captive animals' care wherever possible. Training creates positive interactions with humans, gives animals the ability to understand, predict and control situations, and prepares them to be life-ready in a human world they may otherwise find challenging and stressful.

Positive reinforcement training doesn't involve fear, force or coercion. Training that involves punishment, use of aversives, and/or causes distress (anxiety/fear and/or frustration) in animals should be avoided. Punishment is unfair to animals - it causes emotional distress; it doesn't teach animals what is expected from them; it sets them up to fail; it breaks the human-animal bond; and can be damaging for many reasons - and it doesn't always work well and/or is badly applied.

"Mark and reward" is a form of positive reinforcement training, and involves using an event marker (commonly, a word or noise [such as a clicker], or a visual signal) to provide information, and feedback, to the animal on what behaviours the trainer likes and wants more of. The marker is followed up with the presentation of a reinforcer the animal desires. It can be used to teach all animals (including humans!) anything within the bounds of their physical and mental capacity, and offers choice and control to the learner.

"Mark and Reinforce" (AKA Clicker) Training:

Mark and reinforce trainers use the principles of applied behaviour analysis (ABA). ABA involves working with observable and measurable behaviours, noting what happens immediately before (antecedent = A) and after

(consequence = C) an observed behaviour (= B) - this is known as the ABC unit of behaviour. The antecedent facilitates or elicits the behaviour, and the consequence is the outcome a learner is working to gain or avoid.

Positive reinforcement training, using mark-and-reward training, harnesses animal's learning ability based on operant conditioning. All animals – human and non-human – are constantly observing the environment, predicting outcomes, noting the significance of events around us, basing decisions and actions upon sensory inputs, our needs and current states, and what we need to gain or avoid in a given moment – and learning from it! Each experience informs the next as we hone skills and abilities. “Mark and reinforce” training utilises this natural process in a structured way to *observe*, *mark* and *reinforce* desired behaviour. It is a clear and efficient method. When behaviours are fluent, and the animal can confidently do them anytime or anywhere, we no longer need to *teach* them, but we should take time to maintain them - especially “high value” behaviours, such as coming when called – by always reinforcing in a way that is welcomed by the animal.

Mark and reinforce training, is also known as clicker training, “event marker” training, “mark-and-reward” or “bridge” training. It is a way of communicating with the animal learner to provide information on what we like and want to see more of. The “mark, click, or bridge” is the event marker. The “event” is the desired behaviour being trained for.

The common marker tool of choice is a clicker, but any kind of clear, distinct and easy-to-perceive visual, auditory or tactile marker can be used to “capture” behaviour. It also must be easy for the human trainer to use quickly and without extraneous movement/distraction. Examples could include:

- A specific auditory device, such as a whistle, bell or clicker. A clicker is a popularly used device - it is a small, hand-held gadget that makes a “tic-tak” noise at the moment the desired behaviour occurs.
- A special word, such as “good” or “yes”. Whilst this can work very well, especially for maintaining known behaviours, human voices are commonplace for pet animals. The voice may therefore not be a specific/distinct noise, which is only heard in the training scenario. Humans talk a lot! Voices change with mood, or health-state. The voice carries emotional meaning – it's not neutral. It's sometimes hard to be quick enough to mark certain precision behaviours accurately enough with the voice, as opposed to something more distinct.
- A more distinct human sound that the animal can discern from normal chit-chat, such as a mouth/tongue click, or a high-pitched “peep”/squeak.
- Something visual, e.g., a flash of light, i.e., from a torch, or a hand signal, such as a thumbs-up (however, the animal must be looking in the trainer's direction at the right time to see this). Visual markers can be useful for hearing-impaired animals.
- A tactile marker, such as a light finger-touch in a specific place, e.g., the rump/shoulder - this can be useful for hearing impaired animals +/- those with *both* hearing *and* visual impairment.
- There are many other great event-marking possibilities, and it is not always necessary to stick to one type - it will depend on the animal's needs, their level of fluency in training, their knowledge of a behaviour, the animal's environment and experience, and the skill or ability of the trainer.
- The marker should be something consistent, neutral and different from anything else the animal is likely to be familiar with, and only used in the training setting.

- It is important that the chosen marker is perceived as a positive stimulus for the animal. They should not be startled or frightened by it, but should appear interested, relaxed and seek a reinforcer whenever they perceive their marker.
- When training multiple animals in the same vicinity, different markers may be chosen for each, to prevent devaluing of the signal.
- There are many different types of markers to suit all learners and trainer abilities – remember, markers are happening naturally in nature *all* the time! Whatever is chosen to mark behaviour in a given situation with an individual animal, the important thing is how it's used - i.e., at the exact time the desired behaviour happens. The reinforcer then follows immediately afterwards (detailed below).

For simplicity, from now on, we shall refer to the marker as a clicker, but as above, there are many other options that can be chosen as an event communication signal to *instantly* let the animal know it has succeeded, and that they are *promised a reinforcer*.

The click should be instant the behaviour is happening (not before or afterwards). The term bridge is sometimes used as the click is made *as* the behaviour is occurring, the animal then knows it has been successful, and that a reinforcer is on the way - therefore the marker has *bridged* the gap between the communicative signal, saying "yes, you are right (and I promise you a treat)", and the delivery of the food, treat, toy, etc., as chosen by the learner.

The marker is given meaning/value by pairing each click with a reward (e.g., food, fun, toy, etc). The marker soon comes to mean "you did the right thing; a treat is on the way as a reward".

Reinforcers (rewards) – the learner gets to choose:

Does it have to be food? No – but food is great! There are many other way to reinforce, depending on the learner's choices. A clicker-savvy animal is working for the click, known as a secondary, conditioned or learned reinforcer. It is thought that there is an intrinsic feeling of success akin to: "yes! I got it right!", which we then also back up with a primary reinforcer to maintain its value. A primary reinforcer is something a learner doesn't need to be taught to enjoy, e.g., food, fun, freedoms, etc., – many types of reinforcers (colloquially termed rewards) may reinforce behaviours being trained/maintained.

In the beginning, food tends to be an easy universal "pay scale" to get things started. All healthy living creatures eat, so trainers will find something the animal will work for and values, which is often food. When determining an animal's reinforcer, it is important to "ask the animal", "interviewing" them with various option in different situations. Individual animals have preferences, so trainers endeavour to discover if one animal prefers play, if another prefers food, or social/physical interaction, or if permission to go out of the door is the best reward for waiting at the door.

When teaching difficult behaviours, or those requiring emotionally difficult learning, trainers aim to use the highest value reinforcer possible (of course, always making sure the learner is emotionally comfortable when training – which may impact food preferences at that time, or de-prioritise eating). The rate of reinforcement is also kept high for difficult tasks, i.e., rewards are given generously and quickly.

So-called errorless learning is key to welfare-centred training, and is most efficient. Clicker trainers aim to set the environment up so that the animal can only be right, and therefore the animal doesn't have an opportunity to perform unwanted behaviours (during a training session, and – ideally – in life!). This is termed *antecedent arrangement*. Rather than using any form of aversive or punishment, the most effective way to deal with unwanted behaviour is to prevent it from happening, whilst meeting the animal's needs - rather than simply ignoring or preventing reinforcement for it (which can be punishing). Susan Freidman says: "there are no problem behaviours, just problem situations" – effective behaviour change involves establishing the motivation for unwanted behaviours, then making it irrelevant and ineffective for that animal, whilst teaching something more appropriate, fulfilling-to-the-animal and rewarding in its place. The aim is to teach an alternative behaviour that is incompatible with the unwanted behaviour, but which serves the same purpose for the animal (i.e., provides the gained/avoided consequence). This is ABA in action.

Practicalities - how to get started:

Marker/clicker training involves three key skills: **observe, mark, reinforce**.

- First, we must have one single clear criterion for marking - it's important to decide this before starting. The behaviour of choice can be selected by quietly observing the animal for a time, writing down what they naturally do, then deciding to capture something from that, and shape it into something else. Or it may be that you have a goal behaviour in mind, in which case, we would plan the steps to the outcome objective. In addition, the animal's environment can be managed so as to set them up to do the behaviour and prevent unwanted behaviour during training. Then:
 - *Observe* for the behaviour (or step) that has been selected.
 - *Mark* (click) at the exact moment that the behaviour happens (not before, or after).
 - After the click, *reinforce* by providing a desired reward (do not give this at the same time as, or before the click, but just afterwards ~within 1-2 seconds).
 - The marker and reinforcement must be separate events, and not overlap each other. The food/toy/reward must be out of sight/out of mind until after the click, so as to prevent inadvertent distraction, luring, or reinforcement for unwanted behaviours. The click is made during the behaviour, THEN the reinforcer is produced.
 - Repeat for short sessions until the learner is offering the behaviour confidently. Then we may add a cue, and/or move onto the next planned increment.

Human skills: Become a great observer – getting used to watching and pinpointing the minutiae of an animal's behaviour is the first skill, as well as deciding on what exactly the desired behaviour looks like. Plan whether to click for an entire movement cycle, or an increment.

Then, **get the behaviour** – arrange the environment to make it likely for the target behaviour to occur spontaneously and easily. Then, watch and wait, ready to click for the behaviour *as soon as it starts happening* (it's like snapping a photo!). This is known as **capturing** – trainers take what the animal offers and say "yes!", e.g., the animal lying down from a stand. Working in increments towards the desired behaviour is termed **shaping**, e.g., to shape a down, trainers might initially click/treat a few times for the animal sitting, then for animal's head

dipping, then the shoulders going lower, then the front legs coming forwards, then the elbows touching the floor, etc. Shaping entails clicking + reinforcing any incremental progress toward the finished behaviour – the level, precision and finesse reached is limited only by imagination and time!

Clicker trainers do not rely on physical moulding, or aversives to obtain or prevent behaviour. In order to instigate actions that may not initially happen naturally, careful and respectful luring or prompting (without coercion), or **targeting** may be used to begin a behaviour being trained. E.g., the animal may initially follow a treat, or can be easily trained to touch a nose, a paw, a hip, the whole body, etc. to a target – usually taught first with capturing – which then helps kick-start new behaviours.

Once the behaviour of choice is being offered confidently and fluently in each training session (ideally with a >90%+ success rate), trainers will **add a cue**. A well-taught cue is an opportunity for the animal to gain reinforcement of some kind. Therefore, cues should be treated with care, and never wasted, so as to keep them valuable and strong!

NB: Modern trainers prefer the term “cue” to the old-style nomenclature of a “command,” which implies a threat: “do it, or else”.

Cues can be in many formats – visual/hand signal, verbal, olfactory, non-verbal auditory, environmental, etc. The new cue is given just as the new behaviour is *beginning*. E.g., for the animal has learned to touch its nose to a spoon, through capturing - when it is looking deliberate, and the animal is happily engaged in the process, the trainer then says “touch” just as the animal’s nose is committing to touch the spoon. As the nose touched the spoon, the trainer clicks, then the treat is given. Thus, the cue is added to the new behaviour using classical conditioning, and the animal learns that the cue predicts an opportunity to gain reinforcement through doing the specific behaviour asked for. After several repetitions, the cue of “touch” can be given before the animal touches the spoon, and it will know that to do so will produce a click and a treat, thus the animal can be asked to perform the behaviour in future.

Once the cue is added and the animal associates this signal with the new behaviour, a stepwise process begins of teaching the animal to wait for it, to only give the taught behaviour in response to the cue, to perform it instantly, to be able to respond to it in incrementally more difficult and distracting situations until it is completely fluent – a process known as building stimulus control (further discussion of which will have to wait for another day...!).

Conclusion:

Positive reinforcement training should enhance animals’ welfare and benefit them. Training should always be a positive experience for the animal, and the tasks within its physical, mental and emotional capability. We should also consider the ethics of teaching the planned task - i.e., what is the intended purpose and advantage for the animal +/- the human-animal bond? Would the animal choose to take part if given a choice? Is it kind, fair, fun? Will it add value to the animal’s life, if yes - how, etc.? We must have empathy, and ensure the animal is willingly, happily engaged in the process. Once all those aspects have been considered, then it’s time to get the training kit out and have some fun together!

Sources of information, and suggested further reading:

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