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All work and no play? Modifying the behaviour of animals

Tuesday 22 February 2011

CSIRO Discovery Centre, Canberra

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Edited by Melina Tensen

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Carrots and sticks: Principles of animal training

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Throughout history animals have been used to assist humans in work and play or simply to satisfy our curiosity. Several paintings from Ancient Egypt demonstrate that we have been charming, cajoling and exploiting animals for many thousands of years. One example depicts men hand-feeding hyenas that are shown lying on their backs, a feature that strongly suggests that they were tame. There is evidence from the same source that gazelles, ibex and oryx were equally relaxed in human company. In view of the enormous investment of time required for the gentling of non-domesticated species, it is fascinating to speculate about the jobs these animals performed in Ancient Egypt. Some of the uses to which animals have been put in the past may seem unacceptable by modern ethical standards. For example, the Romans tied songbirds to bushes in their gardens and even used animals to torture and execute their enemies.

Animals have long been used to keep vermin such as rats away from human households or grain stores and to act as guards warning of possible intruders. Across different cultures such guards have included geese, guinea fowl and pigs, as well as dogs. Large species such as horses, donkeys and cattle have for many millennia been used as sources of power. In its crudest form this means traction, as in pulling ploughs, sleds or carts. Later, animals were also used to provide power for primitive machines designed, for example, for milling grain or for raising water from deep wells. Similarly, dogs were forced to run in large wall-mounted wheels to turn roasting-spits.

None of the forms of work mentioned so far required large changes in the animals' behaviour. In contrast to these relatively simple uses of animals, in the domains of hunting and herding humans since pre-history have sought to increase their efficiency by investing considerable time in training animals. Training means changing the frequency with which animals show certain behaviours. Unwelcome behaviours become less likely, while desirable ones become more likely.

Although the behaviour of intensively trained animals can fascinate us, the animals with which most of us have frequent contact are those that have come into our homes as companions. We may be using animals less in the workplace, but we are not necessarily spending less time with them. Even highly domesticated companion animals need to be trained, although the level of dedication and expertise needed may be far below that required to train a grand prix dressage horse or mine-detecting dolphin to perform at the highest level.

Over the very long history of training animals, a variety of expert traditions have developed. The language used to describe them is just as varied. For example, the way a shepherd describes how to train his dog is very different from the accounts of how they train their animals that might be given by a falconer or by an elephant trainer. However, the central premise of animal training is that these differences are superficial ones and that the same general principles apply to any kind of animal training.

One set of principles has to do with behaviour that is largely determined by what kind of animal it is. We refer to this as instinctive behaviour. Although this is an old fashioned and ambiguous term, nevertheless it is better than any other label for denoting behaviour more strongly determined by an animal's genes – its nature - than by its experience – its nurture. Exotic animal trainers are acutely aware of those aspects of instinctive behaviour that relate to training success, and also the way that instinctive behaviour changes as a result of experience. One of the core principles of training is that based on positive reward; the 'carrot'. The properties of such learning have been extensively studied by psychologists using various kinds of conditioning methods. A related set of principles, have been derived from conditioning studies that have employed aversive events – 'sticks' – to find out how punishment works (and sometimes doesn't work) and how avoidance behaviour is learned. That said, the subtlety of stick use and indeed the elegance of carrot use are continuing to grow as information technology, among many other educational tools, allows us to share best practice. Many attempts at training fail because the trainer assumes that animals have very human-like ways of perceiving and thinking about the world. The limitations of this assumption and the realities of animal intelligence are central to any discussion of ethical training.

The RSPCA Australia 2011 Scientific Seminar will explore the animal welfare implications of training animals by asking how our attempts to modify animal behaviour affect the animals themselves. It will present the views of a range of experts in animal behaviour and training with experience with companion animals, working animals, livestock, zoos and animal parks. You will also hear the results of cutting edge studies on working dogs and racehorses.

The training you see described in the day's presentations represents the end-point of a long process of behavioural modification that may have begun when the animals were very young. Some of the animals featured will have been purpose-bred and selected for the specific jobs tasks they perform, while others will have been born in the wild. Having considered various approaches, you will be better able to decide for yourself whether it is right or wrong that animals are used in these ways. Are certain behaviours undignified? Is making animals work for our own purposes justified? How do we motivate animals to perform, or behave the way we want them to, and do any of them actually enjoy it? Can we use training to improve the welfare of individual animals? And are the training methods used always acceptable, even when they are out of public view? How can animal welfare be ensured when animals are required to work for a living? Should zoos require their animals to perform? Can this enrich their lives? It is possible that your informed response to these questions may then be at odds, say, with your views on riding horses. Regardless of these dilemmas, this seminar should add to your fascination with the non-human animals with whom we share the world.

Problematic pooches: An alternative approach to dominance

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Abstract

Animal behaviour is a rapidly growing and expanding field. Applying dominance theory to pet behaviour problems has long been considered flawed. Sadly, in recent times, there has been resurgence in popularity of techniques using this paradigm. Where does dominance theory stem from? Is this a valid approach? What does it mean for dogs? We will also briefly explore alternative, kinder methods of dealing with problem behaviours in dogs.

Introduction

In recent years, there has been resurgence in popularity of dog training methods that espouse "dominance" models of dog behaviour.

These models suggest that wolves live in hierarchical packs with the alpha wolf at the top. Dogs evolved from wolves and also live in hierarchical packs. Dogs see us as part of their pack. And many behavioural problems seen in dogs are caused by dominance or dogs wanting to be the alpha dog. Therefore, the way to solve many behavioural problems is to be dominant and the leader of the pack.

However many of these assumptions are erroneous, are often harmful to dogs and the human-animal bond.

What do we know about wolf packs? A lot of initial research about wolf behaviour was conducted by studying captive wolves. This is because wild wolves tend to avoid humans and were difficult to study. It was these studies that generated the idea of 'packs' with the alpha male and female breeding pair at the top of the hierarchical structure. However, in this false environment, wolves could not disperse and escape from confrontation with other wolves, so relationships developed that are not necessarily reflected in more natural wolf groups.

More recent studies of natural wolf groups show that they tend to live in families. The group usually consists of Mum and Dad, the current litter, and possible juveniles from one or two previous litters. Dr. David Mech (an eminent wolf researcher) has said: "In natural wolf packs, the alpha male or female are merely the breeding animals, the parents of the pack, and dominance contests with other wolves are rare, if they exist at all."

So how about the relationship between dogs and wolves? Most scientists accept that dogs evolved from wolves or they had a common ancestor. However dogs are not wolves. They are different anatomically, physiologically and socially. The biggest difference between wolves and dogs is their ecological niche. Wolves, as a rule avoid humans. And dogs have evolved to live near humans.

What is dominance?

People commonly describe dominance as a trait of an animal. However it is not a personality trait, rather it describes relationships between individuals.

> "A relationship between individuals that is established by force, aggression and submission in order to determine who has priority access to multiple resources such as food, preferred resting spots, or mates"
>
> (Bernstein, 1981; Drews, 1993)

Dominance is also fluid. It changes with context and it changes with time.

During the presentation we watched a dog trainer applying the dominance model to treat a dog exhibiting a behaviour problem. During the video, the problem dog "Emily" was shown with her family, a happy and friendly dog. However, on taking her on a walk and seeing another dog in the distance she became very reactive - straining on the leash, barking, growling and looking aggressive. The trainer attributed her aggression to dominance. The owners were instructed they needed to roll her on her side (sometimes known as an 'alpha roll') whenever she exhibited this behaviour, so that she could learn to be submissive.

At first glance, this strategy appears to have worked. She is lying on her side, no longer showing signs of aggression.

However, if we look closer at Emily's body language it becomes clear she is looking very distressed. She is panting heavily, her pupils are dilated and her eyes are exopthalmic (popping out). These are all signs of severe distress and discomfort.

This method is not safe or humane for Emily. There is also a real concern that owners or handlers could become injured using such methods.

Let's also look at the idea of Emily being forced into a position of submission. Does this reflect real interactions between real dogs? The answer is of course no. In real life, the submissive dog chooses to roll over. The dominant dog does not forcibly roll the submissive dog over. We also have question the relevance of a third party (a human) rolling her into submission.

However, the most important question is: what has Emily learnt from this interaction? Has she learnt to be calm around other dogs? No. I think she has learnt that when she meets other dogs she feels stressed out, bad things happen and she can't trust her handler to look out for her. He has placed her in a highly stressful situation and then he has added to the stress by forcing her to lie on her side. And the next time she meets another dog she is most likely to be more aggressive.

AVSAB (American Veterinary Society of Animal Behaviour) Position Statement: Animal training, behaviour prevention strategies, and behaviour modification programs should follow the scientifically based guidelines of positive reinforcement, operant conditioning, classical conditioning, desensitization, and counter conditioning.

Plainly speaking, we need to find win- win solutions. This means using non confrontational methods that work for people and for dogs. Nobody likes to be a loser, and dogs don't like it either.

This may involve a shift in thinking. Usually our clients are focussed on stopping behaviours. They usually ask questions such as "how can I stop my dog from …… However our focus should be on creating behaviours we like. Better questions are: What behaviour would we like our dog to perform? How can we motivate our dog to want to perform that behaviour?

An alternative approach - the 3 Ms

With any treatment program it can be useful to think about the three Ms - Management, behaviour Modification and Medication.

Management

Management is a very important part of any treatment program as it prevents rehearsing unwanted behaviours. The more often behaviour is practised, the stronger it becomes. In fact, some problems are best managed than cured. Dogs that bark at possums at night are often easiest managed by having the dog sleep indoors at night.

If you have a dog that jumps up on people, how are you going to manage the dog when guests arrive? Do they need to be on a lead? Should they be in another room until the excitement settles?

What about a dog aggressive dog? Are there times and places you can walk him to avoid meeting other dogs? You probably want to avoid the off leash park so that random dogs cannot run up to him and cause a reaction.

Management solutions can be short term or long term. Management solutions will also vary from dog to dog and situation to situation. However they should always be part of your plan.

Behaviour modification: Changing behaviour.

How do we change behaviour? We change behaviour by targeting the motivators driving behaviour.

Broadly speaking dogs can have problem behaviours and behaviour problems.

Problem behaviours are relatively normal behaviours performed by normal dogs that we find annoying. This might include jumping up on people, pulling the washing off the line and chewing your favourite pair of shoes. Problem behaviours are solved by preventing the unwanted behaviour from being rewarded – this is where your management plan comes into place. *Then reward an alternative behaviour incompatible with the unwanted behaviour.* This might include sitting politely. Or sitting quietly on a mat and chewing a bone or a Kong stuffed with food. Or grabbing hold of a toy rather than barking.

Behaviour problems on the other hand, are truly abnormal behaviours. These include aggression, fears, phobias and anxiety. Behaviour modification of behaviour problems involves changing how dogs feel about the things they are worried about or changing their internal emotional state, i.e. good things happen when they… meet other dogs, meet new people, are left on their own or during thunderstorms. This is also known as counter conditioning and desensitisation.

Change the dog's internal emotional state (motivation), so that they are no longer anxious or fearful and the external behaviour changes too. They no longer look frightened, show aggression, panic during thunderstorms, etc.

Medication

Some behaviour problems require medication. Medication is particularly important for problems where the cause of the fear or anxiety cannot be controlled, e.g. thunderstorm phobias. We have no control over the weather. If your dog is having panic attacks during thunderstorms regardless of what you do, the kindest thing is to medicate him. Make him feel better and reduce his fear.

Many dogs with anxiety and fear issues have significantly reduced quality of life. Medication is very necessary for these dogs also. Obviously it goes without saying that medication should only be used in conjunction with management and behaviour modification strategies. Some dogs need to stay on medication for a few months until the management and behaviour modification strategies kick in. However, some dogs need to stay on medication for the rest of their lives. And, if this leads to an improvement in their quality of life, then that's fine too.

There will always be a myriad of ways to change behaviour in our pets. We need to ensure that the methods we use are kind and humane. Fortunately, by looking at our pet's body language we can assess how dogs are coping with each method. However there is always room for improvement. And we need to keep asking the question - What is my dog learning? Make sure he is learning none of the bad things and all of the good things.

The Australian Working Dog Survey – what do we know about Australian working dogs and their trainers?

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Abstract

The Australian Working Dog Survey collected information about the housing, sourcing, breeding, assessment and training and veterinary care of 4195 Australian working dogs. The responses included representatives from four working dog sectors: 1) Private industry (farm, hunting, security/guard, and detection); 2) government; 3) assistance; and 4) sporting dog (greyhound, sled, sheep/cattle trial, schutzhund).

The results that varied the most between the four working dog sectors were those that related to the approach to training and the equipment used to train working dogs. Across all industries, only six percent of respondents indicated that they had undertaken formal certified education (i.e. TAFE level) in dog training. Almost all of these trainers were working in assistance and government working dog programs. The most common response for the approach to training in assistance and government working dog groups was the use of positive reinforcement principles - food (assistance) and play (government). In comparison, correction and electric shock collars were most commonly reported to be used by working dog trainers who have not received formal certified education in dog training.

In private industry and sporting dog sectors, where trainers reported that they relied almost entirely on their own skills and experience to train working dogs, the reported use of positive reinforcement in training was much lower. The use of electric shock collars, the average length of time taken to train dogs to a competent working level was longer and the working lifespan of dogs was also shorter for these two groups. It appears that working dog trainers in the private industry and sporting dog groups who may not have had access to the information available through formal certified training programs are using training methodology based on popular opinion rather than learning theory paradigms such as positive reinforcement.

The use of punishment has the potential to compromise the welfare of working dogs. The results from this Survey suggest that formal certified education increases a dog trainer's ability to apply a range of options, alternatives and approaches when aiming to teach a dog to perform a particular task. It was found that the higher the education level of the trainer and the more complex the task the dog is required to perform, the lower the likelihood that electric shock would be used. The distinct differences between the approach to training working dogs by government/assistance and private industry/sport groups that have emerged from the Australian Working Dog Survey merit further consideration. This survey has highlighted the need for an assessment of the opportunities currently available for Australian working dog trainers to improve their understanding of how dogs learn.

Paper

Follow the link to download the Australian Working Dog Survey Report.

Velocity, whip use and race results in Thoroughbred racehorses

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Abstract

Concerns have been expressed regarding animal-welfare issues associated with whip use during Thoroughbred races. However, there have been no studies of relationships between performance and use of whips in Thoroughbred racing. Our aim was to describe whip use and the horses' performance during races, and to investigate associations between whip use and racing performance. Under the Australian Racing Board (ARB) rules, only horses that are in contention can be whipped, so we expected that whippings would be associated with superior performance, and those superior performances would be explained by an effect of whipping on horse velocities in the final 400 m of the race. We were also interested to determine whether performance in the latter sections of a race was associated with performance in the earlier sections of a race.

Measurements of whip strikes and sectional times during each of the final three 200 metre (m) sections of five races were analysed. Jockeys in more advanced placings at the final 400 and 200 m positions in the races whipped their horses more frequently. Horses, on average, achieved highest speeds in the 600 to 400 m section when there was no whip use, and the increased whip use was most frequent in the final two 200 m sections when horses were fatigued. This increased whip use was not associated with significant variation in velocity as a predictor of superior placing at the finish.

Paper

Follow the link to download An investigation of racing performance and whip use by jockeys in thoroughbred races.

Virtual fencing systems for cattle – can we ever make them welfare-friendly?

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Abstract

Virtual fencing aims to contain cattle without the use of a fixed fence, using audio and electrical stimuli applied through GPS collars as an alternate means of control. Development of virtual fencing systems is seen as having future benefits for cattle management. For extensive systems where there are few fixed fences, virtual fencing would enable greater control over grazing and optimisation of pasture use. In intensive farming systems such as dairy, there would be reduced labour inputs from repeatedly shifting electric fencing for strip grazing. Virtual fencing would also be beneficial in protecting environmentally sensitive areas with complex and time-variable boundaries.

The development of virtual fencing systems for cattle using electric shock raises significant ethical and animal welfare issues. For successful and ethical virtual fencing, systems need to be developed to enable the effective learning by cattle of associations between non-aversive conditioned stimuli, such as a sound and a reinforcer, such as electric shock. The cattle need to associate the sound with their approach to the virtual fence boundary and learn to respond to the conditioned stimulus alone so as to avoid receiving an electric shock.

This paper will discuss some of our research findings on virtual fencing in cattle. This includes a study to assess the effectiveness of an audio cue as a conditioned stimulus for virtual fencing, and the welfare impacts of electric shock on cattle.

What is virtual fencing and why is there an interest in it?

Fixed or temporary electric fencing is widely used to contain cattle at pasture. Virtual fencing aims to contain cattle without the use of a fixed fence, using signals to the animal, such as audio and electrical stimuli applied through GPS collars as an alternate means of control.

Development of virtual fencing systems is seen as having future benefits for cattle management. For extensive systems where there are few fixed fences, virtual fencing would enable greater control over grazing and optimisation of pasture use. In intensive farming systems such as dairy, there would be reduced labour inputs from repeatedly shifting electric fencing for strip grazing. Virtual fencing would also be beneficial in protecting environmentally sensitive areas with complex and time-variable boundaries.

Animal learning components for virtual fencing

The development of virtual fencing systems for cattle using electric shock raises significant ethical and animal welfare issues. For successful and ethical virtual fencing, systems need to be developed to enable the effective learning by cattle of associations between non-aversive conditioned stimuli, such as a sound, and a reinforcer, such as electric shock. The cattle need to associate the sound with their approach to the virtual fence boundary and learn to respond to the conditioned stimulus alone so as to avoid receiving an electric shock.

Most importantly, the audio cue and electric shock need to be applied in response to the animal's behaviour, rather than just its location. This enables the animal to learn that its behaviour induces the electric shock, and modification of its behaviour will enable it to avoid receiving the shock. The conventional electric fence for cattle provides a good example of associative learning, where an animal learns quickly to avoid an aversive unconditioned stimulus and stays within the fence boundary. In this case, the unconditioned stimulus is the electric shock and the conditioned stimulus is the visual appearance of the fence.

The Animal Welfare Group at CSIRO conducted a study to test if access of cattle to a location can be controlled by an audio cue (Lee *et al*., 2009). Our hypothesis was that cattle would exhibit associative

learning by responding to an audio cue alone to stay within a virtual fence boundary. The first study was conducted to identify an effective audio cue. Audio (784 Hz tone) and shock (600V, 250 mW) stimuli were delivered by remote control to GPS collars on five heifers to prevent access to an exclusion zone surrounding a feed trough. An audio cue was administered when the animal entered the exclusion zone, followed by a shock if the animal continued to proceed. There was an increase in the proportion of heifers responding favourably to the audio cue by turning, backing up or stopping in sessions three and four (73%) compared with sessions one and two (44%). This indicated that cattle associated the audio cue with the electric shock and learnt to avoid the trough. The main study examined whether cattle location can be controlled by an audio conditioned stimulus without the presence of a visual cue. Weeks 1-2 tested heifers' learning of the association between an audio conditioned stimulus and an electric shock reinforcer. In week 3, the effect of dispensing with the conditioned stimulus was tested. Heifers were allocated to two treatments (n=11). Treatment 1 received an audio cue and an electric shock on exclusion zone entry, as in the first two weeks. Treatment 2 received no audio cue and only an electric shock on exclusion zone entry. There was a difference in the behaviours shown in response to both the audio and shock stimuli between weeks 1 and 2, with more heifers turning in response to the audio cue in week 2 than in week 1. When the virtual fence was moved in week 2, 80% of animals ignored the first audio cue, but the proportion failing to respond to the second audio dropped to 46%, indicating that animals had learnt to avoid the electric shock by responding to the audio cue alone to remain within the virtual fence boundary. In week 3, heifers received significantly fewer shocks when a conditioned stimulus was used. There were no differences between treatments in scores for effectiveness of the fence, appropriateness of the stimulus and adverse responses.

The approach we used in this study was a combination of classical conditioning and operant conditioning. When an animal approached an exclusion zone it received an audio cue (conditioned stimulus) and if it continued to move forward, it received an electric shock (unconditioned stimulus). The animals responded by turning back or stopping (avoidance) which could be called an operant response. The audio cue was effective at producing an avoidance response only because it was paired with the electric shock. The electric shock acted as a reinforcer because it changed the probability of approaching the exclusion zone and increased avoidance responses in the cattle.

This study demonstrates that cattle have the ability to learn an association between an audio cue and an electric shock to remain within a virtual fence boundary. Our findings strongly support the use of an audio conditioned stimulus for virtual fencing as this reduces the number of electric shocks animals receive thereby improving animal welfare. The virtual fencing protocol used in this study was effective at training cattle to respond to an audio cue conditioned stimulus to remain within a virtual boundary and avoid receiving an electric shock. We believe that an ethical approach to virtual fencing will require that the animal has understanding of its situation and has control over how it chooses to behave. Our results here suggest that this may be achievable.

Animal welfare assessment

Despite the widespread use of electric fencing and the conduct of research into virtual electric fences for cattle, there is limited information on the effects of typically-used electrical stimuli on the behavioural and stress responses of the animals. If electrical stimuli are to be used to contain cattle, either with conventional electric fencing or with virtual fencing, then there is a need for animal welfare evaluation The Animal Welfare Group at CSIRO conducted two studies to assess behavioural, heart rate and stress hormone responses of cattle to electrical stimuli typically used in such confinement applications (Lee *et al*., 2008). In the first experiment, 30 steers (18 months old; n=10 per treatment) were held in a handling crush for 15 min after receiving one of the following treatments: nothing (control); delivery of three shocks at 2 s intervals (600V, 250mW); and restraint in a head bail for 3 min. Plasma cortisol and ß-endorphin concentrations were measured at 0, 5, 10, 15 min, 1 h, 2 h, 3 h, and 4 h. In a second experiment, heart rate and behaviour were measured in 17 heifers (18 months of age) subjected to one of the following treatments whilst held in a crush for 10 min: nothing (control; n=5); delivery of three shocks at 2 s intervals (600V, 250mW; n=6); and restraint in a head bail for 3 min (n=6).

Cortisol and ß-endorphin concentrations did not differ between treatments ($P>0.05$). Whilst animals were receiving the treatments, heart rate was lower when head restrained compared with shock or control treatments ($P=0.009$) and did not differ between control and electric shock treatments ($P=0.35$). Upon release from the crush, heart rate was higher in shock and head restrained treatments than the control treatment ($P=0.005$). Animals receiving the electric shock treatment tossed their heads more frequently whilst in the crush than control animals ($P=0.012$) but did not differ from the other treatments in the number of vocalisations, tail swishes, steps back and forward, head tilts and head turns. There was a

significant effect of treatment on flight time (P=0.005); animals receiving the electric shocks were faster to leave the crush than control animals (P=0.005) and there was no difference between head restraint and shock treatment (P=0.86). In the 10 min following release from the crush, there was no treatment difference in the time to start feeding.

In summary, the present study demonstrates that the stress hormone response of cattle to three unpredictable electric shocks is no different to common handling procedures such as being held in a crate for weighing and restraint in a head bail. There was some evidence of increased heart rate and flight time in cattle in response to receiving electric shocks but this was no greater than that shown in response to head restraint for 3 min. It is important to highlight that this study used a low energy electric shock that has been used in our virtual fencing studies, but it is quite possible that stronger shock intensities may elicit a greater stress response. Accordingly, these findings should not be generalised to other contexts such as higher level electric shock intensities or to different species. The implication of this research is that conventional electric fencing and virtual fencing that use a suitable level of electrical stimulus could be regarded as humane for cattle, particularly if cattle learn about the electric fence and can choose to avoid it after an initial learning period.

Future directions for virtual fencing

The CSIRO Animal Welfare Group is no longer working on virtual fencing as the key knowledge gaps have been determined from a behaviour and welfare point of view. Virtual fencing requires overcoming cost and technological limitations to become a reality. However, because of the great benefits and growing interest in virtual fencing, it is likely that companies will develop commercial systems. We believe a similar approach to what we have described in this paper should be taken to ensure animal welfare is not compromised.

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HELP: An elephant-friendly model of training the working elephant

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Abstract

Elephant training is around 5000 years old and currently there are approximately 15,000 working elephants across Asia. Like horse training, elephant training techniques are immersed in folklore and handed down from generation to generation. They are underscored by mindsets of dominance, submission and respect and consequently they have all the retributive and unethical trappings of such notions.

In early training ('breaking-in'), elephants in all Asian countries typically undergo harsh confinement that is characterised by pain from metal spikes and spears used until the animal 'submits' and ceases to react altogether. This can result in spontaneous latent hyper-aggression that confers a deadly toll on mahouts. Such suffering on both accounts is entirely unnecessary.

When elephant training is based on 'learning theory', pain and punishment are eliminated and the results are positive. Following learning theory workshops in Nepal in 2007, the Nepalese Government offered the elephant breeding centre in Bardia (southwest Nepal) as a pilot program where all five young elephants were to be trained using learning theory principles so that a comparison can be made at a later date with traditionally trained elephants. In 2010, the learning theory methodology was given approval for elephant training throughout Nepal. Last year, The HELP foundation (Human Elephant Learning Programs) was formed, bringing together a group of people with various skills to facilitate such training in Asia. The training program in Nepal is now in its fifth year and our older trained elephants are in the forest successfully enabling poaching-surveillance work as well as other chores such as being used in a tiger census in Bardia National Park.

HELP's program is dually focussed on teaching mahouts as well as training elephants. Mahouts are taught the use of learning theory and the principles of training that arise from this knowledge. The elephants are trained using a six-phase program centred on the progressive shaping of their in-hand and ridden responses culminating in working elephants that are safe, confident and obedient.

INTRODUCTION

Elephant training throughout Asia is ancient and has its roots many millennia ago in Assam. Like the training of any ridden animal such as horses, donkeys and camels, elephant training techniques are entangled in folklore and legend, handed down from generation to generation. Interestingly, in all ridden species, the prevailing view of the recipe for successful human-animal interactions arises from mankind's historical preference for hierarchical relationships since hunter-gatherer times – a fixed linear hierarchy where rank is maintained by ritualised aggression. In other words, mankind has embraced systems of dominance and submission hierarchies where one individual is made to respect the one above. This has been manifest in the military, in schools, business and even in family relationships. Nowadays however, the notion of dominance is diminishing (except in the military, of course) in favour of more dynamic and interactive relationships. However, in traditional horse and elephant training across Eurasia, the belief that success in training comes from dominance through ritualised aggression is still mainstream. Central to this belief structure is the mindset that the animal already knows what it should do, but until you make it respect you, it will not be of service or 'willing to please'.

On the other hand, what humanity now knows about animal learning is relatively very recent, less than a century old. This body of knowledge is called 'learning theory' and began with the tradition of the behaviourists culminating in the work of B.F. Skinner whose theoretical contributions form the basis of training animals in zoos. This knowledge also explains the effects of the interaction between riders and their charges including elephants and their mahouts. Fundamentally, animals are motivated to obtain certain goals, and on achieving them, their actions are rewarded and the stimulus response connection is reinforced by repetition. For instance, animals are motivated to remove even the smallest amount of annoying vibrating pressures on their bodies, and if any action on their part causes the pressures to go away, the animal repeats the reaction that worked. Therefore, in early learning the young elephant learns

that tactile vibrations behind its ears disappear when it goes forward, it learns to go forward each time these stimuli occur, and thus the animal feels secure in the implicit knowledge that it has the control to diminish its irritations. Thus the mahout should stop the pressures when the animal gives the correct response. Food is another motivation. If the animal learns that a certain reaction causes the delivery of food, it will repeat that action. These ideas are the basis of negative and positive reinforcement.

Furthermore, if the animal learns that a certain event repeatedly precedes a known motivator (food or comfort), the event comes to predict that reward. This is how animals learn the various signals human trainers use to control them. In elephant training, the problem is that some reactions are complex (such as picking up a coin with the trunk), however this training feat can be achieved by setting up a training protocol where the task is broken down into related steps, where each step leads obviously to the next and is rewarded and consolidated by repetitions. For example, the elephant may be rewarded with a morsel of its favourite food for sniffing *near* the coin with its trunk, and when that is repeated by the elephant each time, the task is modified to the next step so that now the elephant is rewarded only for *touching* the coin and so forth. By this time the elephant is very keen on interacting with the coin and soon is rewarded only for *picking it up*. Then it is rewarded each time the coin is brought *closer* to the human. This successive approximating toward a goal is called shaping and is a vital tool in training. Myriad training possibilities are achievable if the steps are small and well thought out.

What negative reinforcement is …

Often referred to as 'pressure-release', negative reinforcement is defined as "the subtraction of something aversive (such as pressure) to reward a desired response". So when you sit on a pin, you get off NOT because it hurts, but in fact because it *stops hurting* when you do so. Even the mildest touch is negative reinforcement if its removal causes a reaction in the animal. When you blow on your coffee to cool it you are doing negative reinforcement. Animal training based on negative reinforcement is only ethical if pressures are reduced to very light touches.

What negative reinforcement is NOT…

In many simplistic discussions on animal training, negative reinforcement unfortunately is often confused with punishment of the animal, such as, for example, a scolding voice, a smack or tap with stick or other object. Indeed this interpretation is incorrect. Negative reinforcement is not termed negative because it is worse than positive reinforcement, but because it is about *subtraction* of an aversive stimulus when a desirable response emerges. Punishment on the other hand is defined as "a decrease in the likelihood of a response due to the presentation of an aversive stimulus." It doesn't matter much what behaviour emerges so long as the bad one doesn't. So negative reinforcement should not be regarded as something to avoid but rather as something to use correctly so that all pressures on the animal's body reduce to light, relatively unobtrusive signals.

When an animal is trained correctly from the beginning, there should be no reason to use punishment. Punishment is typically a feature of training programs that are confusing, and then trainers (including mahouts) mistake expressions of confusion (conflict behaviour) for bad or malicious behaviour that requires or even deserves punishment.

Using pressure-release and food morsels (which is gradually phased out) to motivate, reward and shape desirable responses and then installing cues or voice commands by association is the basis of the HELP training system. With many repetitions the elephant learns to do what is asked of it by sheer force of habit. Animals are happy and secure as a result of an accumulation of solid habits as these give the important benefits of security, controllability and predictability. In the same way as humans develop habits (such as riding a bicycle or driving a car) the animal learns its training as second nature and it soon becomes so deeply embedded in its life so that it knows nor desires any other way: such is the power of habits. We are no different, we have the power to change many things in our lives but we generally stick to our entrenched life patterns in work, rest and play. This 'learning theory' approach to elephant training involves no violence, and so none of the problems associated with violence occur compared with traditional approaches.

The early training of elephants is traditionally based on breaking its spirit and making it submissive. It involves much pain which is inflicted until there is no resistance or reaction, over a period of many days. This is not only counterproductive to training an animal to respond to pressure signals, but also sets up some very serious problems that threaten the safety of mahouts and other personnel associated with the elephants. Traditional methods invariably involve punishment – pain delivered after an act, or after an incorrect response. Punishment for non-compliance is not only difficult for the elephant to fathom; it increases the probability of latent aggression. When animals are subjected to pain or fear, their brains are wired to seek to *control* that fear or pain by reacting, running away *or* fighting it. Occasional fear or pain followed by escape or attack has little negative effect as the animal learns ways of controlling the situation by fight or flight. However, when animals (or people) are subjected to repeated *inescapable* pain because they are tethered, imprisoned or trapped, (punishment with the ankus whilst ridden falls into this category) they learn that they *do not* have control over their environment. There is a compelling analogy between the subsequent behavioural effects on the elephant and chronic PTSD (Post Traumatic Stress Disorder) phenomena in humans.

Some of the cardinal features of chronic PTSD in humans are: hyperarousal symptoms, aggression, marked avoidance behaviours, and the re-experience of the symptoms of the trauma. In soldiers experiencing severe inescapable and prolonged trauma in war, post trauma reactions are frequently evident, and according to research, significantly higher in prisoners of war. PTSD may show up as sudden hyper-aggression and violence triggered perhaps by a mild fearful experience or a relatively benign situational trigger, such as the noise of a balloon bursting at a children's birthday party or a conflicting emotional situation. Such events are not restricted to humans. Elephants show similar patterns. With an alarming similarity to human cases where severe PTSD is implicit in human tragedies, the elephant often remains at the side of the dead mahout. In Kerala, India, with a population of 900 working elephants, one survey (Elephant Lovers Association) reveals that 2 people die through elephant aggression per month. There, elephants are frequently used for ceremonial purposes, so fireworks can typically trigger spontaneous aggression in vulnerable and insecure elephants. Elsewhere in India and Asia, there may be no single trigger, but just a steady increase in the elephant's threatening behaviours leading to aggression at some point later. Unfortunately and unnecessarily, traditional elephant training practices throughout Asia centred on creating submission through inescapable pain during 'breaking-in' and punishment for non-compliance throughout life are most likely responsible for the sudden hyper-aggression shown by wild caught and captive elephants.

HELP

The first elephant training system using learning theory (including negative and positive reinforcement) was started by WEPA (the Working Elephant Program of Asia) of which I was one of three founding directors. The work was sponsored by WWF and WSPA. Following learning theory workshops in Nepal in 2007, the Nepalese Government offered the elephant breeding centre in Bardia (southwest Nepal), as a pilot program where all five young elephants were to be trained using learning theory principles so that a comparison can be made at a later date with traditionally trained elephants. In 2010, the learning theory methodology was given approval for elephant training throughout Nepal. Last year, I decided to begin an Australian NGO and the HELP Foundation Ltd was formed (Human Elephant Learning Programs). In Bardia, of the five young elephants, the three three-year-olds began their foundation training in 2008 whereas the one-year-old and two-year-old learned in-hand training at that time. In December 2010, we began foundation training these two young elephants and this process is being continued by the mahouts at that training facility now. Our charity training work is now extended to the rest of Nepal by invitation from the Nepalese government and we are beginning training workshops in India following a successful tour in 2010 at various centres lecturing and demonstrating these techniques.

METHODOLOGY

Tools: Each day's training sessions begin with a short theoretical workshop on learning theory and training principles that arise from learning theory. Voice commands are used a secondary reinforcer, employing in this case in Bardia, Nepal the language of the local ethnic group, the Tharu dialect. (Of course, elsewhere the voice commands would be different). Food used are 'kuchis': vine leaves wrapped around rice and salt and palm sugar, part of the animal's staple diet. A blunt stick is used to apply pressure.

A. Mahout training

Learning terms

- *Habituation*: when an animal becomes accustomed to a stimulus. For example, an elephant has to get used to other animals and events. In training, the elephant has to get used to the rider on its back and the saddle.
- *Positive reinforcement*: is the addition of something pleasant such as food that rewards a response. To be effective, the food has to arrive at the same time as the desired behaviour. Usually a word (*Teek!*) marks the moment (secondary positive reinforcement) of the correct behaviour and then food follows after. Caressing the elephant on the bulb of the head has also been found to be an effective positive reinforcer.
- *Negative reinforcement*, also called pressure-release: is the *removal* of something unpleasant (such as pressure) which rewards the desired response. In ridden animals this is very salient. The pressure is continued or, if no response, increased and then removed as soon as the animal gives a near-correct or improved response. Soon it learns to respond to the very light pressure because it precedes the stronger pressure. In any situation however, if the animal does something and pressure goes away, it thinks that this movement made it go away. So if the elephant shakes and the rider is removed, the elephant now knows that shaking makes riders come off. Therefore when first habituating an elephant to a rider on its back, the rider should, if possible, try not get off until the elephant has stopped.
- *Classical conditioning*: (Learning new signals) When food or pressure-release is established, new signals can be added to also elicit the same responses. When adding new signals such as voice commands or light pressures, they should occur in a train before the strong pressure. So the most efficient training is when you have voice, then pressure, then the removal of the pressure. Consistently and then later intermittently, the removal can be accompanied by '*Teek!!*' then food.
- *Punishment*: is when pain is used after or during bad behaviour. In order for it to be at all effective, it should be contiguous with the offending behaviour. Punishment has effects that inhibit training. For example, it frequently elicits a fear response which can be resistant to extinction and it can cause animals not to trial new responses. Punishment is never to be used for non-compliance.
- *Shaping*: The successive approximation of a behaviour toward a targeted desirable behaviour through the consecutive training of one single quality of a response followed by the next.

Learning principles

- Establish positive reinforcement with a look away (trunk away) response
- Start with the lightest pressures, then reward correct attempt at responses (positive reinforcement)
- Increase pressure gradually with no gaps releasing or the correct or near correct response (negative reinforcement)
- Don't add new signals until the first is consolidated
- Add new signals by making them the first thing you say or do (classical conditioning)
- Try to get 3 to 5 good consecutive repetitions and then 3 sets of repetitions for every stage to help form habits
- Only change one aspect of training at a time to avoid overloading and confusion
- Be consistent with the use of signals (i.e. same voice, same place, same way, etc)
- Break training goals down to smallest parts, then train them one by one (shaping)

B. Elephant training

Training system

PHASE 1. In-hand: Establishing movement

1. For young elephant, nervous to touch: counter condition to touch using secondary positive reinforcement. Train the elephant to keep its trunk away using secondary positive reinforcement also.
2. Forward (positive reinforcement) vibrating pressure (stick then fingers on both ears) on posterior of hind leg until a single step forward occurs. On response *Teek!!* and cease signal, then food.
3. Backward (positive reinforcement) vibrating pressure (stick then fingers on anterior shoulders) on anterior of fore leg until a single step backward occurs. On response *Teek!!* and cease signal, then food.
4. Turn (positive reinforcement) vibrating pressure on lateral shoulder stick on shoulder then fingers on ear base) until a single step of turn occurs. On response *Teek!!* and cease signal, then food.
5. When the above is consolidated, repeat above steps but precede with voice commands *Agate!* (forward) *Chou* (Backward) and *Emhir!* (turn) respectively.

Consolidate by repetitions until signals and voice produce responses

PHASE 2. In-hand: Continuous movement

1. Forward, using pressure-release until a progressively increasing number of forward steps occur. Voice first (*agate!!*), then if no reaction, vibrating pressure (fingers if not stick) from person on ground when the elephant slows or ceases to move (positively reinforce). The elephant is stopped using pressure-release (from fingers if not stick) on the anterior foreleg (a backward signal) preceded by the *Rah!!* (be still).
2. Backward, using pressure-release release until a progressively increasing number of backward steps occur. Voice first (*chou!!*), then, if no reaction, vibrating stick from person on ground (positively reinforce). The elephant is stopped using the stick on the posterior hind leg (a forward pressure signal) preceded by the *Rah!!* (be still).
3. Turn using pressure-release (fingers on ear lobe) until a progressively increasing number of turning steps occur. Voice first (*emhir!!*), then, if no reaction, vibrating stick from person on ground (positively reinforce) on the elephant's shoulder. The elephant is stopped using the stick on the opposite shoulder (a forward pressure signal) preceded by the *Rah!!* (be still).

Consolidate until elephant goes from voice and or light signal

PHASE 3. Habituation of elephant to rider

4. Training elephant to make positive associations with rider and to habituate to having a rider on its back. There are 6 steps in this process and each should finish with the rider getting off. It is best to get off only when the elephant is still in order to reward stillness. Immediately the rider achieves each stage, food (kuchis) is given and the elephant is stroked. The rider tries not to dismount if the elephant is moving at all. There should be at least 3 sets of 3 consecutive repetitions in a row for each of these stages:
    a. The rider presses down on the top of the elephant's shoulders
    b. The rider makes small jumps up and down beside elephant
    c. The rider jumps up and is held there by the assistant who holds his leg.
    d. The rider jumps up and lays across the elephant's body.
    e. The rider jumps up and lays his knee over the elephant's back.
    f. The rider brings his entire leg over the elephant's back.
    g. The rider jumps up and sits up.

Consolidate until elephant is calm being mounted

PHASE 4. Exclusive control by handler (with rider aboard)

1. Forward signals from person on the ground (as in Phase 2).
2. Backward signals from person on the ground (as in Phase 2).
3. Turn signals from person on the ground as in earlier in-hand work (as in Phase 2).

Consolidate until elephant is completely relaxed

PHASE 5. Partial control by rider

1. Forward signals now from rider and enforced by person on the ground if necessary. First use voice (*agate!!*) then immediately increase pressure of toes of both feet of the rider, release as response is given. If no response from toes immediately follow with increasing fingers or stick pressure from person on the ground (positively reinforce occasionally with food and other times with stroking)
2. Backward signals now from rider and enforced by person on the ground if necessary. First use voice (*chou!!*) then immediately increase pressure of both heels of the rider, release as response is given. If no response from heels immediately follow with increasing fingers or stick pressure from person on the ground (positively reinforce occasionally with food and other times with stroking)
3. Turn signals now from rider and enforced by person on the ground if necessary. First use voice (*emhir!!*) then immediately increase pressure of toes of one foot of the rider, release as response is given. If no response from toes immediately follow with increasing stick pressure from person on the ground (positively reinforce occasionally with food and other times with stroking)
4. *Rah!!* is maintained as the signal for immobility.

Consolidate until responses occur from each single signal

PHASE 6. Complete control by rider

1. All forward signals now from rider. First use voice (*agate!!*) then immediately increase pressure of toes of both feet of the rider, release as response is given. (Positively reinforce occasionally with food and other times with stroking).
2. All backward signals now from rider. First use voice (*chou!!*) then immediately increase pressure of both heels of the rider, release as response is given. (Positively reinforce occasionally with food and other times with stroking).
3. All turn signals now from rider. First use voice (*emhir!!*) then immediately increase pressure of toes of one foot of the rider, release as response is given. If no response from toes, the rider should immediately begin increasing pressure with the stick. (Positively reinforce occasionally with food and other times with stroking).
4. The use of food rewards is randomised and reduced over time.

Consolidate until responses are immediate from rider's voice and light signals

Further training

Subsequent trips to Bardia have involved deepening the elephant's responses to the basic locomotory signals to ensure a high level of predictability of signals thus conferring controllability to the elephants. This gives them greater security and what laymen would consider as 'trust' and we have seen the transformation of the young elephants over the years and this has also been noted by mahouts, giving them confidence in the elephants and the methodology.

On a recent trip, the HELP team designed an H-shaped 'labyrinth' for more precise training of responses where the elephants learn to undertake certain manoeuvres inside the obstacle.

The work of HELP is to extend into all facets of elephant training such as precise trunk use. However, the most important objective is to give the elephants a humane start to their working life in order to drastically improve safety for both mahouts and elephants.

CONCLUSION

Elephant training must be extricated from the veiled brutality of folklore and handed to behavioural science to reorganise. There is no question here of 'if', it is only a question of when, and which country will take the first steps. Nepal is perhaps somewhat ahead at this point in time, however India is beginning to show great interest through the Wildlife Trust of India and that country has an advantage as a result of its more developed education system. Each country that trains elephants must develop a uniform approach to elephant training.

There is also the mahout. The mahout should have a positive view of the importance of his vocation. He must feel its importance through pay and conditions worthy of such a culturally important task. Without exception, mahouts need education in elephant learning processes, and training principles and tasks that arise from such principles. So mahout schools need to be set up in the countries that train working elephants. If this essential education were the focus of governmental initiatives, great steps forward could be made in sparing the elephants the agony of unnecessary stress in early life and in saving the lives of mahouts. There are around 12,000 working elephants throughout Asia and in order to disseminate ethical elephant training systems, HELP requires urgent funding (see www.h-elp.org). The early life of every working elephant is a preventable tragedy that is in our hands to change.

Cruelty, compromised welfare and training – a Devil of a mix

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Abstract

How often do we ask the question 'Can we' when it would be more appropriate to ask 'Should we'. There is a constant bombardment of new possibilities, new theories, and the latest cult 'animal whisperer' media personality. A seemingly insatiable appetite to adopt the latest quick fix diet regime, new training technique or money making scheme leaves little time to ask 'Should we be doing this?' There needs to be a degree of examination and scepticism before accepting the instant fix, quick sound bite type of approach. Even scientific research needs to be rigorously examined before acceptance.

This question 'should we' has great relevance when applied to animals and modifying their behaviour or training them. Assuming one can answer the ethical question of 'should we' train a particular animal in the affirmative then 'how should we train' becomes the question. Successfully training animals requires an understanding of how they learn and what motivates them. That understanding is also critical in being able to change behaviour. It also means that cruelty and compromised welfare can be avoided.

An animal's motivational state changes continually as a result of both external and internal changes. External changes may be exogenous, emanating from changes in the outside world that are perceived by the animal, or endogenous and stemming from the animal's own behaviour. There are many ways of interpreting motivation but as an animal trainer Resource Holding Potential (RHP) provides a useful starting point because it defines areas upon which the trainer can work. Put simply it is 'How much do I want something, what do I have to do to get it and what will it cost me'. This concept is useful in understanding the limitations of using training techniques that use fear, pain, food deprivation or frustration.

Learning theories are plentiful but training methodology can be reduced to the use of reward and punishment. Simplistically, in order to change a behaviour, one can either punish an undesired behaviour or reinforce the desired one. Again the question is 'which method should we use'.

I propose to examine how dogma in theories has lead to practices which at best compromise welfare and at worse can be classed as cruel. By way of illustration, I will use examples of fear and pain used under the discredited 'dominance theory' in dog training, electric shock as a containment device such as used in the 'Freedom fence' and electric cattle, sheep and horse fencing and the technique of frustrated non reward as used in food deprivation training.

I will contrast this with reward based training as used on a working Border Collie and a Tasmanian Devil in a Wildlife Park. Both cases exemplify the highest achievement of training. Firstly, one animal being trained to remotely work another animal and the other a highly dangerous animal being handled for the public. Perhaps by understanding what can be achieved, people will question their own training methods and further improve their success as animal carers and trainers.

When it comes to animals, I have done just about everything wrong that you can imagine. I've collected birds eggs, I've put kittens down the well in a bucket to wash them, I've hit dogs with a rolled up newspaper and rubbed their noses in their own poo to house train them. My only saving grace is that eventually I reached my *Ah ha* moment and promised myself I wouldn't get things wrong anymore.

Paul McGreevy kindly mentioned my irascibility; well this character defect is probably due to being bounced on my head too much as a baby. Being dragged backwards and forwards between the house and an air raid shelter whilst Herr Hitler and the Luftwaffe tried to remodel our vegetable garden was not the best thing for my frontal lobe which as you know is where the behavioural inhibition system sits. So that's my excuse for being a GOM. Grumpy Old Man.

I've come to the point where I'm likely to growl at the next person who tells me they are an animal lover, or a positive reinforcement trainer, or mentions horse whispering or calls me a devil whisperer and as for behavioural enrichment, reality TV shows and the hero worship that goes with beating a dog into submission mentally and physically because it's a 'dominant dog', I'm likely to bite someone.

I'm just not programmed to adopt the other three 'Fs' -- Fight is my domain. So I thought you might forgive me being a grumpy old man if I can explain the reasons why it's taken 68 years to get me to this stage.

There is a real danger in accepting change in the way we interact with animals, their training and their welfare because we **'can do'** something; when asking **'should we'** would be more appropriate. I believe we have become far too accepting of science and the latest research and theories that result. Too ready to accept instant experts and their novel techniques particularly if they get prime time ratings for a TV show. I would suggest the need to be much more sceptical and questioning.

How sceptical should we be about science? The image of scientists as objective seekers of truth is periodically jeopardized by the discovery of a major scientific fraud. Recent scandals like Hwang Woo-Suk's fake stem-cell lines or Jan Hendrik Schön's duplicated graphs show how easy it can be for a scientist to publish fabricated data in the most prestigious journals. The University of East Anglia's Climatic Research Unit also came under investigation over climate change issues.

In surveys asking about the behaviour of scientific colleagues, admission rates were 14.12% for falsification, and up to 72% for other questionable research practices. Fanelli (2009) '*Considering that these surveys ask sensitive questions and have other limitations, it appears likely that this is a conservative estimate of the true prevalence of scientific misconduct*'. There doesn't need to be deliberate misconduct for things to be array. The dominance theory applied to dog ownership is a case in point.

Once a scientific theory becomes accepted the damage to animal welfare can be incalculable. Dr Perrin spoke of using the dominance theory in treating behaviour problems in pets so I will limit my comments to how using this theory in the training of animals and in particular dogs has lead to so much cruelty and compromised welfare.

There are so many assumptions that have to be made to accept this 'Dominance theory' that it is truly remarkable that it wasn't challenged much earlier. This theory developed through mistakes by scientists in interpreting wolf behaviour (Zimen (1975), Mech (1970)). Basic errors made were in interpretation.

1. The studies were on captive unrelated wolves that suggested a hierarchy maintained by aggression and a rigid social structure.
2. The wolf is the ancestor of the dog so these conclusions could be applied to interactions between dogs.
3. Humans adopted dogs into their pack so dogs must perceive this relationship in terms of relative status or hierarchy.
4. If one wishes to train a dog the human must be the alpha wolf or dominant dog.

The suspicion would be that because this all fitted into the human psyche of believing we are 'higher than the animals' and therefore-- Me man you dog, I say you do! The theory was accepted with great gusto. Dominance theory dog training was born.

This proceeded unchallenged for many years and so well embedded in historic scientific literature and the minds of the public was the concept of dominance that this resulted in a great deal of cruelty and compromised welfare. Books were written, Think Dog and Dogwise (Fisher 1990 and 1992), You and Your Dog (Taylor 1989), TV personalities emerged as dominant trainers (Barbara Woodhouse) and more scientific papers were written (Kovary (1999)).

I quote from one:

> *The right way to punish a dog. Never beat a dog repeatedly – you might injure it. A reasonable punishment is to grasp the skin at the back of the neck (in large dogs use both hands, either side of the neck) and raise the dog off the ground (this is how a bitch would naturally punish an unruly puppy within the pack). Give it a good shake and a harsh verbal scolding at the same time. As a simpler measure a light slap on the rump will often suffice.*

That was written by an eminent and internationally known veterinary surgeon in 1989.

There were some trainers who did not accept the theory, myself included and never used it in training a dog or solving a behaviour problem. Although I was taught that this pack leader mentality was the way to train I found it didn't work for me. Maybe this was the beginning of my scepticism in becoming a doubting Tomas concerning scientific theory.

For completeness it is only fair to mention that with considerable courage in 1999 Mech published *Alpha status, dominance, and division of labor in wolf packs*, in which he corrected his earlier mistaken ideas. In the 2003 book *Wolves: Behavior, Ecology, and Conservation* edited by Mech and Boitani, the term "alpha" is only ever mentioned to explain why it has been superseded. The explanation of the wolf's supposed fight for dominance and alpha status was changed to one where parents and older siblings 'train' the younger offspring.

I believe training is more of an art than a science and more about relationships, feelings and animal understanding than scientific theories. I believe that the best way to change thinking is to show a successful difference rather than presenting a scientific theory.

One of my mentors at university was Dr John Bradshaw. We had many discussions about the dominance theory and the Resource Holding Potential theory. This resulted in my producing a sheepdog training video that successfully showed a different approach to dog training that was not based on dominance.

Recent research has shown the dominance theory to be erroneous and it was Dr Bradshaw who I believe helped change thinking. Bradshaw *et al*. (2009). Unfortunately, although the majority of trainers and behaviourists no longer accept the dominance theory, some new authors to the field interpret certain aggressive signs as 'dominant' because their definitions are based on older literature (e.g. Peres-Guisado and Munoz-Serrano 2009) and so tend to perpetuate the theory.

In addition, certain TV so called 'dog whisperers' also perpetuate these out dated ideas. It is very hard to bury a scientific theory once it has been generally accepted so we need to be vigilant and rigorous before acceptance. Dispelling myths behind each new theory is therefore an important step in enhancing the welfare of animals in our care and preventing cruelty.

Whether it is in the field of training, as I've mentioned, or conservation, commercial production or pet ownership, bunkum is bunkum. Before you accept from scientists or experts the reason for bringing Asian elephants to a housing block size enclosure in Sydney is for conservation reasons, before you accept the reason for sow stalls and battery cages is because they are kinder for sows and hens and before you accept the reasoning that there is a 'right way to punish your dog' check them out very carefully.

It is worth examining just how far the dominance theory applied to training dogs allowed cruelty to flourish and created so much misery. Once the idea was generally accepted, ways had to be found so that every dog owner could become the dominant pack leader. The ingenuity of the human species was put to the test and boy, did it triumph. Choke chains, prong collars, shock collars, auditory alarms, whips, jerk leads, pistols, water bombs and other devices too distressing to name. All in the name of modifying animals' behaviour.

I suppose we have to be eternally thankful that no scientists studied lions and came to the conclusion that because they hunt and live in a pack they must have a dominance hierarchy and therefore pet cat owners need to dominate their cats. Unfortunately, it hasn't stopped products that use electric shock or invoke a startle response being marketed for cats here in Australia.

Australian ethics committees and politicians should hang their heads in shame at the way Australia lags so far behind in animal welfare. Veal crates, stag and fox hunting, battery farming, sow crates and even the sale of battery farmed eggs have or will all be banned in Europe. Questions about what animals are feeling, how and what they are learning and the purpose of the training are largely ignored in the overwhelming miasma of ignorance and vested commercial interests.

So what are the implications of using training techniques that use fear and pain?

1. Decrease the animal's ability to learn (Joels *et al*. 2006, Mendl 1999, Walker *et al*.1997).
2. Inhibit the target behaviour but leave the underlying emotional response unchanged, thereby increasing the chance of future problematic behaviour.

3. Increase the animal's anxiety about the situation in which it is used.
4. Induce an aggressive response or new displacement activity (Polsky 1994, De Keuster and Jung 2009).
5. Cause physical injury.
6. Induce learned helplessness through lack of understanding what action is required (Schalke *et al*. 2005).
7. Raise many health and safety issues for the animal and trainer (Reisner *et al*. 2007).

Punishment training has been used for centuries but when the punishment knowingly uses pain or fear then surely this must be classed as cruelty. The legal definition may not sustain cruelty but the moral argument is overwhelming. Furthermore, to use pain or fear to change behaviour requires a very high level of understanding of learning theory and animal motivation for success and any mistake in administration is likely to have serious consequences.

For positive punishment to be effective, it must fulfil certain criteria, namely:

- It must be contiguous. It must happen at exactly the same time as the behaviour for maximum effect. The longer the delay in time with the behaviour, the less likely the dog is to associate the stimulus with it.
- It must be consistent. It must happen every time the behaviour happens, or the association between the stimulus and the behaviour is less likely.
- It must be intense enough for the dog to consider it sufficiently aversive to not perform the behaviour ever again.

The biggest dilemma for the trainer using these techniques is the intensity of pain or fear to use. Punishment must be viewed from the animal's perspective. Not only is **type** of punishment breed specific (some breeds are more touch sensitive than others), but also individual specific (not all individual's sensitivities within a breed are similar). The **level** of punishment is also breed, individual and mood specific. The animal's emotional state will dictate the level at which it finds a stimulus aversive.

Let me use the analogy of smacking children to the use of an electric collar on dogs. I am not advocating the use of electric shock collars on children nor smacking. The reason as an animal trainer that I would suggest smacking rarely is effective is because of the need for the pain to be sufficient for the child never to repeat the action. So we have to come in at the highest level possible in order to be successful.

Who knows sufficiently well what this level should be. The emotional and motivational mood of the child, its pain threshold on different parts of the body, the size of the pain site, the strength of the punisher, all need to be in the equation. The margin of error is very small (Brush 1957). Too much pain can cause long lasting traumas, insufficient will mean the behaviour will be repeated. Intensity is guesswork – and every time might be different.

Most parents play safe and give a gentle slap the first time which is increased in intensity when the unwanted behaviour is repeated. However, once the child learns to 'work through' the pain, it becomes ineffective and has to be increased – but the child has already learned that it can work through it once. Soon a beating won't stop the behaviour and eventually the end point of violence is you end up with the need for two fully armed prison officers to deliver one toilet roll to a prisoner in the cell. Incremental aversive stimuli don't work (Azrin, Holz and Hake 1963). For a more comprehensive argument concerning the use of electric shock collars see author's input on the submission to the Scottish Parliament (Ryan & and Englefield 2006).

I mentioned motivation and this plays an important part in training. I find that the concept of resource holding potential (RHP) and value placed on a resource is useful when thinking about an animal's motivation when training (Parker 1974). Put simply, this means: How much do I want something, what do I have to do to get it and what is the likely cost to me.

Thus a dog with a Freedom fence style shock collar may approach the invisible boundary and get a signal of an aversive stimulus about to be delivered if it continues to try to cross the boundary. The dog retreats and lies down. Supposing the same thing happens when it's a male dog and outside the fence is a bitch on heat – RHP. Motivation is very high to pursue, dog can easily run to the bitch, it will receive a heavy shock. Dog goes after bitch, takes the hit and I leave the rest to your imagine.

So not only are there all the reasons given earlier for not using pain in training, this motivational change shows how impossible it is to set the intensity of the shock. Motivation changes both internally and

externally. One last negative consequence in the above example that I'm sure you will now realise is that when the dog tries to return home the motivation to cross the line may not be as great as before to accept the hit of the shock, so the dog does not return.

So what other forms of training need examining for compromised welfare and cruelty concerns. Frustrated non reward is another example when used in conjunction with food deprivation, either short term or long term. Denying food to an animal has many behavioural effects but an important effect if used in training is that of frustration. The removal of an expected reward is punishing and when used by an expert can be very successful at changing behaviour when put on cue. However, it involves frustrating the animal and if one accepts the hypothesis that frustration equals fear (Gray 1971). A strong argument can be advanced similar to that mentioned earlier. I have to confess that I have used frustrative non reward in treating certain behavioural problems but have also paid the price in the early days of not fully understanding exactly what was going on.

So much for punishment based training. The world is becoming enlightened and there is a new mood afoot for reward based training. Many countries have banned the use of corporal punishment on children and even parts of Spain have banned bull fighting. So let's all rush out and become the latest buzz word - a positive reinforcement trainer. Well let me tell you I'm not a positive reinforcement trainer and neither I will suggest are you. That's why I threatened to bite the next holier than though, woolly headed fluffy person who tells me 'Oh, I'm a positive trainer, I only use positive reinforcement in training'.

When I train an animal, I have to have a rapport and empathy for the animal. I want an understanding based on compatible rules. Punishment and reward is a fact of life for everyone. We don't get what we want all the time. Rewards and punishment go together.

Certainly I don't use physical punishment such as suspending a dog on a choke chain, finger jabs in the rib cage, hold downs, alpha rolls, scruffing, loud noise, sprays, etc. Try those on a Tasmanian devil and you won't live long.

The vital elements of training are consistency, timing and understanding. I don't believe that any trainer who has a relationship with an animal is a 'positive only' trainer. To say otherwise is to lack a full understanding of training.

When I approach training I think of motivation, drive and RHP. What is this animal going to feel, what am I going to feel, what's in it for us both. I much prefer to use the internal drives that motivate us both rather than the methods that use tangible rewards. In a nutshell, I try to place the animal in a situation where it will produce the behaviour I want to train it to perform and then I put the behaviour on a cue. There are rewards for us both in our internal drives. Border Collies have been honed for hundreds of years to want to herd sheep; training is just getting them to do this in a way that benefits the shepherd.

The Tasmanian Devil is highly fearful nocturnal animal so understanding how not to frighten them and how they react and training becomes a pleasure for both of us.

I have some excerpts from my sheepdog training video which demonstrate the above method. In the first one you may recognise Dr Ian Dunbar and I used a clip from a show I was making with him about instinctive drive and training. He wanted to witness the first time a well bred sheepdog went to sheep. The next piece is a novel way of teaching a lie down—hands off. The third one is showing a little of the results of the training. On each occasion it is possible to see how the dog is manoeuvred into the situation where it performs the behaviour required. In the case of teaching the lie down, it is merely a case of putting an obstacle in the way of the dog returning to the trainer such that it has to go onto its belly ('lie down') to get under a gate or a fence. By giving the lie down command as the dog is in the process of going down and then a reward ('Good dog' or a click if using clicker training) in a very short time the dog will take the lie down as a command in every situation.

At the highest level of sheepdog work at the international championships it is necessary to send the dog out a kilometer to gather a flock of ten sheep which have to be brought back to the handler. After they pass through a set of gates 200 metres in front of the handler the dog has to be told to leave these sheep and go and fetch another set of ten sheep and then bring these back to join the other ten. Five of the twenty sheep have red collars and after driving the flock round a 600 metre course through gates the shepherd is then allowed to leave the post and has to separate out the five collared sheep and put them into a pen. Dogs that have been trained by punishment techniques tend to be unreliable and in any case the use of electric collars was banned by the International Sheepdog Society many years ago.

Training a wildlife park Devil may seem an unwise thing to do but I believe they do benefit from it. It is explained to the public that the devils will remain in the wildlife park all their lives and we want to make their normal behaviour commensurate with this. Training our devils is a slow process and applies an ethologists and etiologists approach. It is only by understanding our devils that it is safe to apply the training. Devils evolved to be marsupial, nocturnal, food scavengers and hunters. The mainland environment eventually proved too tough for them and Tasmania became their last refuge. They had to be highly adaptive to survive. They became these unique animals that can run 50 km in a night, eat a third of their bodyweight in one sitting, crunch bones with three times the jaw power of a dog, climb trees, swim rivers, produce up to thirty embryos after a gestation period of 16 days, communicate by complex sound and visual signals and protect themselves from predators. They are born highly fearful and whether we like to admit it or not, like us, the game plan is to keep safe, eat and procreate; not the easiest animal to attempt to train.

So we start young with a systematic desensitisation programme. (Wolpe 1954 and 1968). We introduce the conditional stimulus - us, food, etc - gradually using counter conditioning. We have to get past the behavioural inhibition system. We want the devil to say, 'I'm not frightened, what can I do for you?'' And we say 'Well, we want you to do this and then we'll give you a bottle of milk or a meaty chunk'. Very gradually we desensitise the devils to all the fear-inducing stimuli they are likely to meet within the wildlife park. Of particular importance are olfactory acuity, audition and consistency of approach and handling by all keepers. The keeper who offers the back of the hand for smell recognition by the devil or the open palm to pick one up appreciates not to have disinfectant on their hands; fingerless keepers are not adaptive to wildlife park work. We work towards these goals where recognition of a devil's mood is paramount and with a complete understanding of what can trigger the fear response. When handling for the public, great skill is required for this to be a safe practice for the devil, the keeper and the public. The auditory signal a devil uses that warns other devils to keep away has been described as a sharp sneeze. The consequence of a child sneezing in front of a devil being handled for display can be disastrous for a keeper if training skills and safety are lacking.

I have some slides to show of these allegedly nasty, evil, hyena like, vicious animals within East Coast Natureworld. Perhaps these will convince you that Tasmanian Devils are worthy of an image makeover. Important, as their existence in the wild is threatened by the deadly Devil Facial Tumour Disease

So to summarise I would suggest that before we start to modify an animal's behaviour we need to

1. Ask ourselves if what we propose to do is ethical;
2. Make sure any theories we use are proven and scientifically accepted;
3. Select methodology that does not compromise welfare or produce cruelty;
4. Understand the animal; and
5. Understand ourselves.

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Sheep whispering? Evaluating the impact of low-stress stock-handling methods

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Abstract

All livestock movement requires the intervention of humans. In the era of natural stockmanship (whispering), we have a mixed bag of responses from "I have been doing this for years" to "this is a load of poppy cock". Over the last 20 years there has been a trend to go to workshops to learn about how to handle livestock better: less stress (for us and the livestock). Previously livestock handling techniques where handed down from generation to generation, with a "this is the way things are done", type of approach.

Examining the philosophy of "low stress stock handling", are we actually training the animals for our own benefit or are we learning how to understand the animal's instinctive behaviour and manipulating this behaviour so we as humans can interact with the animals to get a benefit. Is the training/awareness done more for us than on the animals themselves?

Is the way we as humans behave and act (instinctively), hindering our communication with the livestock we handle? Whilst most people enjoy working with livestock and it is a choice to do so, handling livestock (sheep/cattle) can at different times be challenging and frustrating. It is during these times, that fully understanding livestock behaviour will result in better choices of how to resolve the situation at hand. Why won't those cattle go up the ramp? Why do those sheep keep stopping? Can't those sheep see that the gate is open? A systems approach to solving the livestock problem is needed.

Much research has been done so as to understand livestock behaviour and promote better handling. Researchers such as Temple Grandin need no introduction when it comes to "handling livestock and their behaviour". Other research has resulted in the development of programs such as ProHand Pigs, ProHand Dairy, etc. But what motivates people to keep up to date on livestock handling techniques? Is it: OH&S issues in the work place; new codes of practice which describe people as having to be "competent" if they handle livestock; increased livestock performance; or an awareness of wanting to do things better?

Benefits and ethics of behaviour modification in zoo animals

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Abstract

All animals, including humans, undergo behaviour modification on a continual basis. Each time a reinforcement is received in direct relation to a specific behaviour, that behaviour is more likely to be repeated. The reverse is clearly true of behaviour that draws a negative response. This natural behavioural response can be used to enrich animal's lives, provide important species knowledge, reduce the need for invasive medical intervention and prepare animals for environmental change, reducing potential stressors. In cognitively active species, behaviour modification through training can be used as an effective form of enrichment, improving well-being, health and reproduction. Targeted behaviour modification can be used to encourage species specific behaviours that are learned rather than innate. For example, mating behaviour, and cub rearing in giant pandas appear to be learned, requiring demonstration or training in order to maintain reproductive success in some individuals. Further, enrichment devices that teach or encourage species specific behaviours, such as the rapid cheetah "fly", can be used to demonstrate unique abilities and biology of wildlife species. Finally, pre-conditioning of animals prior to release is often an important element of success in reintroduction programs. So, behaviour modification can be used to enhance the education value, reproductive ability or conservation success of these individuals.

The ability to modify the behaviour of zoo-based animals can also provide access to samples that would otherwise require anaesthesia. By encouraging behaviours that allow samples to be taken, medications to be given and assessments to be made, important information can be gathered and used to improve the health, well-being and conservation status of animals in zoo-based and free-ranging populations. For example, samples taken with the cooperation of zoo animals have allowed the development of non-invasive techniques to assess reproductive status and well-being, even in free-ranging populations. The well-being and ultimate fate of individual animals should be considered when designing behavioural modification regimes. Intensive behavioural modification may not be appropriate for animals destined for release unless that behaviour will assist in post-release survival.

Free-ranging wildlife species have been conditioned to avoid human communities for centuries, with mixed results. Behavioural modification of free-ranging populations is now playing an important role in species conservation, and human safety. The familiar story of the elephants avoiding strategically placed chillies is an effective and humane method of deterring unwanted behaviour. However, deterrents alone are not sufficient to bring about a desired behaviour (in this case, avoidance of human communities). This must be accomplished through the provision of a viable alternative that reinforces the desired behaviour. By consistently removing the ability of wildlife to gain reinforcement for incursion into human communities, coupled with the provision of thriving habitat that meets their needs (thereby providing reinforcement), wildlife species can be deterred without harm. However, random success has been shown to be a powerful reinforcer, and many wildlife species will continuously test their environment. Perhaps viewing deterrent programs from the perspective of a behaviour modification regime will further improve success.

Using motivation to assess welfare. Are we measuring what we think we're measuring?

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The measurement of motivation has become an important tool used to assess the resources and experiences that an animal values, and subsequently to aid in determining its welfare. However, the relationship between these measurements and welfare state is not well defined, with conclusions normally being based on the assumption that an animal's welfare is reduced if a 'highly valued' resource is not provided. The aim of the research reported here was to investigate the mechanism/s that drive motivation in a behavioural demand feed test and investigate the effect of energy availability on motivational strength, as well as potentially, to provide a better understanding of the relationship between motivation and welfare state.

The experiment undertaken involved investigating the relationship between net energy and motivation for food in a behavioural demand test i.e. is the reason motivation decreases in a feed-based demand test due to the animal reaching a point of energetic balance (energy expended = energy consumed)? Sheep were tested to see how many times in a 23-hour period they would walk a specific distance for a small (5g) food reward and it was hypothesised that they would stop walking (lack motivation) once they had reached a zero energy balance. Eight sheep were trained in a 50m laneway to access a double-sided feeder and gained a food reward with each access event. The distance the sheep walked in the laneway to access this reward was increased progressively on a logarithmic scale (1.5, 6.1, 12.3, 24.8, 50.0, 60.2, 72.5, 87.5, 105.5m) with each test period. Sheep were randomly allocated to one of two treatments (14-hr restriction and an unrestricted control).

The results indicate that both control and restricted sheep worked beyond a zero energy balance and the level of prior food availability had no effect on the distance they were willing to walk ($p>0.05$). Interestingly, the zero balance occurred at approximately the same point as motivation first began to decrease (Pmax). These results indicate that energy input alone does not fully explain changes in motivation for food in a behavioural demand test. Further studies will investigate other possible mechanisms that may contribute to motivation in this specific situation.

Variability of scores in the 2008 Olympic dressage competition and implications for horse training and welfare

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Olympic dressage involves ‘‘an intimate unity between a human and a non-human’’ and is scored by a subjective judging process, under the auspices of the Fédération Equestre Internationale whose Code of Conduct declares the welfare of the horse as paramount. Dressage is of particular interest to equitation scientists and equine ethologists because it embodies the full range of the stimulus-response contingencies that operate in all of the Olympic disciplines. In Fédération Equestre Internationale dressage competition, collective marks are awarded across four domains immediately after each performance. Collective marks are designed to summarise the performance of horse and rider and must reflect the qualities of the entire performance. They are derived from the observation of the judges of the separate test movements. The 4 collective marks include: (1) paces; (2) impulsion; (3) submission; and (4) the rider’s position and seat; correctness and effect of the aids (rider signals). The definition of submission in this context makes reference to lightness and other qualities that align with optimal ridden horse welfare.

We assessed the characteristics of these marks in horses competing in the 2008 Olympic Games Grand Prix (GP; n = 546) and Grand Prix Special (GPS; n = 525) dressage competitions. We also examined the effect of judge location and used Pearson correlation coefficients to explore relationships between collective marks and test-movement scores. All 4 collective marks correlated with each other significantly (P<0.001). The weakest correlation was between paces and submission (r = 0.22) and the strongest between impulsion and rider position scores (RPS) (r = 0.59). In the GP, paces and submission scores were less correlated with test movement scores than the impulsion and RPS scores. In the GPS, submission scores were less correlated with individual movements than the other collective marks. Indeed, they failed to significantly correlate with 19 of 32 movement scores (P<0.05).RPS varied most in the GP (standard deviation = 0.73) whereas submission scores varied most in the GPS (standard deviation = 0.65). A REML analysis across both competitions showed all collective marks were significant in predicting final percentage scores but submission (F = 31.27) made the least significant contribution (paces, F = 61.3; impulsion, F = 69.77; RPS F = 53.01; P<0.001 for all values).

These results speak of considerable variability in judging and suggest that, despite the relevance of submission to horse welfare, judges have considerable difficulty scoring in this domain and aligning their scores with overall performance.

How training in social cognitive tasks may improve quality of life in domestic dogs

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Recent studies have shown that domestic dogs have a unique set of social cognitive skills which enable them to communicate effectively with humans. During experiments designed to test social cognitive abilities, dog behaviours have illustrated that adult dogs are especially proficient at both giving information to and receiving information from humans, in order to accomplish a goal. However, many dogs are surrendered to shelters and/or euthanased due to behavioural problems, which can be caused by a breakdown in communication of expectations between dog and owner.

Training puppies on skills that will be useful for communication with humans throughout the dog's life may be worthwhile. We highlight four social cognitive tasks previously used in dog cognition research: the object choice task, the detour task, the 'showing behaviours' task, and the unsolvable problem task. These tasks are easily modified for a home setting, and simple and inexpensive to implement. We suggest that breeders could train dogs in these skills from puppyhood, to give puppies a 'head start' on communication skills at which dogs naturally excel. Early and continued development of these skills may improve the dog-owner bond, reducing the number of dogs surrendered to shelters.

Development of the Monash Canine Amicability Assessment (MCAA)

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Modern dogs rarely undertake the roles for which they were once bred; most are primarily kept as human companions. Similar to other functions performed by dogs, such as retrieving or herding, dogs differ in their ability to perform this role. A range of canine behaviour assessments exist but few focus on identifying behaviours considered desirable in companion dogs. Furthermore, the validity of many existing assessments is questionable due to methodological limitations identifiable in their development.

The role of human companion is a complex function to define, but a recent survey indicated that the most important characteristics are that dogs be friendly, easy going, relaxed, non-aggressive and sociable. These behaviours closely parallel a canine personality trait previously identified and referred to as 'amicability'.

This paper outlines development of the Monash Canine Amicability Assessment, which aims to measure these characteristics in adult companion dogs. The protocol involves an adaptation of Ainsworth's Strange Situation Test, during which the dog is exposed to an unfamiliar environment and an unfamiliar person in the presence and then absence of the dog's owner. The dog's behaviour is video recorded and later analysed for specific behavioural sequences. After pilot testing and subsequent refinement, the protocol was applied to a large sample of owned pet dogs. We then focused on identifying behaviours that correlate with owner and expert assessments of individual dogs and also those behaviours that discriminate between dogs judged to be the most and least amicable animals.

The ability to accurately assess canine behaviour has many applications. In particular, the ability to measure aspects of behaviour that contribute positively to the ownership experience could enable breeders to select animals most suited for life in the modern world. This has the potential to improve the welfare of many pet dogs.

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