Target training as an intervention for horses with float-loading problem behaviour.

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Abstract

Float loading horses can be stressful and the use of negative reinforcement may lead to both safety and welfare concerns. Horses may display unwanted behaviours in an attempt to escape the float. When horses have existing problem behaviours associated with loading, dangerous behaviours may escalate with the use of negative reinforcement. Previous research concluded that positive reinforcement was an effective way to train horse with problem behaviours. They suggested future research could consider training the owners. Increasing the owners' training knowledge may help improve horse welfare and owner safety during loading. Six problem loaders (four horses and two miniature donkeys) and one naive horse were trained to load by their owners using target training and positive reinforcement. The five owners mastered classical conditioning, target training and positive reinforcement training. Three horses and two donkeys reached terminal criteria, loading within 15 seconds and standing for 10 seconds for three trials across two consecutive sessions. One horse was withdrawn from the study. Generalization was embedded in the training procedure and factors considered likely in the natural environment were included. Findings show appropriate loading behaviour was maintained over time, with data collected for five of the six horses, up to nine months after training. Social validity data was collected using a questionnaire and indicates that owners were using the techniques with other horses and sharing the information. Results show that positive reinforcement can enable safe and ethical loading reducing the likelihood of injury to horse or owner during the process.

Dedication

This thesis is dedicated to my horses.

Sooty, Tommy, Melita, Jamie, Jazzy, Missie and Jaxon – you are my passion, I owe you all so much.

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Table of Contents

List of Figures

List of Tables

Transporting horses using a truck or horse float is a frequent activity carried out by horse owners for a variety of reasons ranging from attending an event, to the sale or purchase of an animal (Slater & Dymond, 2011). Horses may be transported for long or short distances and carried in purpose built vehicles or adapted trucks or trailers (Lee, Houpt, & Doherty, 2001). These factors can impact on the animal's loading experience and can contribute to the ongoing loading behaviour of the animal across its life time (Weeks, McGreevy, & Waran, 2012). Loading problems appear to be a key issue for many owners, regardless of the type of activity their horses perform (Lee et al.; Slater & Dymond). The process of loading the horse into a float can become stressful and dangerous if the horse is not compliant (Slater & Dymond). Many current methods employed by owners can increase the likelihood of accidents or injuries to both owner and horse because of an over reliance on aversive stimuli and handler strength (Goodwin, McGreevy, Waran, & McLean, 2009). Not only are some current practices dangerous but horse welfare is also jeopardized leading to possible behavioural problems and wastage of horses (Waran, 2005).

Evidence suggests that loading can be achieved without the use of aversive stimuli and with the use of techniques that are both sustainable and ethical, based on behavioural science (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). The challenge ahead is to present this evidence-based material to an equine community that has for centuries relied upon field experience and tradition, often referring to horse training as an art form rather than a science (Goodwin et al., 2009; McGreevy, 2007).

Traditionally horses are trained and handled using negative reinforcement; an aversive stimulus is removed when the correct behaviour is emitted (McGreevy, 2007). When horses are asked to perform some potentially frightening tasks such as loading in to a float or horse trailer

however, the use of negative reinforcement may not be as effective or as efficient as positive reinforcement (Hendriksen, Elmgreen, & Ladewig, 2011). Positive reinforcement is the addition of a desired reinforcer contingent upon the correct behaviour and is the primary tool used in experimental research involving horses (J. J. Cooper, 1998; McCall, 1990). Horses in experimental studies involving differential reinforcement and generalisation have displayed similar results to other research animals (Dougherty & Lewis, 1991; Miyashita, Nakajima, & Imada, 2000). Dougherty and Lewis, and Miyashita et al suggested further research into the use of positive reinforcement with horses may assist in achieving better control of equine behaviour and assist in general equine management. Other studies have suggested that positive reinforcement may be safer for handlers and cause less stress in horses under certain conditions (Heleski, Bauson, & Bello, 2008; Hendriksen et al.).

Despite the growing body of evidence supporting the use of positive reinforcement with horses however, Warren-Smith and McGreevy (2008) have noted that owner/trainer knowledge about learning theory and equine training methods may be incomplete. This lack of knowledge may lead to misapplication of both traditional and alternative methods, and give rise to possible welfare concerns such as excessive use of aversive stimuli and possible abuse (McGreevy & McLean, 2009). The assessment of animal welfare now considers a holistic approach encompassing both emotional states and behaviours as well as general environmental conditions (Brando, 2012. p.387). Training methods that lack understanding and knowledge of these considerations need to be questioned despite their success rate or grounding in tradition (Brando; McLean & McGreevy, 2010).

The science of behaviour has allowed animal trainers to achieve a high standard of care and training drawing on basic principles derived from the Experimental Analysis of Behaviour

(EAB) such as positive reinforcement, differential reinforcement, and the use of conditioned reinforcers (J. O. Cooper, Heron, & Heward, 2007). As stated earlier experimental and applied studies have demonstrated the successful application of these principles with equines and suggest that continued research is needed to fully explore the potential of such principles.

Applied Behaviour Analysis (ABA) may assist in providing a framework for future research with horses. ABA considers the functional relations between behaviour and environmental variables through observation, measurement and analysis of behaviour (J. O. Cooper et al., 2007). The ABA practitioner designs an intervention based on baseline observations of behaviour, and then measures behaviour change across the intervention programme (J. O. Cooper et al., 2007). The value of applying behaviour analytic methods in a behaviour change programme lies in the measurement and recording processes. The rigorous measures and recording enable the practitioner to monitor and adjust the treatment as appropriate and provides evidence that the intervention was most likely responsible for any change in behavior (J. O. Cooper et al., 2007) For the purposes of this study behavioural science may assist in increasing loading behaviours, reducing welfare concerns and enlightening equestrians on the potential benefits of these methods.

The aim of this project is to replicate and extend research carried out by Slater and Dymond (2011). Their research investigated the use of positive reinforcement to train horses with problem behaviours to load into a float. This project aims to extend their work by involving the owners in the training process. The two key objectives are, first to use conditioned reinforcers, target training and positive reinforcement to increase loading behaviours in horses with problem behaviours; and second, unlike most applied research with horses, to train the horse owners to implement the intervention with their own horses.

This project will attempt to bridge the gap between equine research and mainstream equestrian knowledge by training the owners to use a training method based on behaviour analytic principles; thereby demonstrating its effectiveness as a sustainable, ethical model of training for a range of equine owners and their horses (McGreevy, 2007).

The following points will be addressed in this thesis;

- Overview of problem and possible solutions
- Literature review of the following;
- Training and welfare concerns
- Behavioural research and equine training research
- Knowledge and training
- Generalization
- Research question and hypothesis
- Proposed outline of research

Following the equine training overview, three possible solutions to loading problems will be covered. Traditional training, welfare and positive reinforcement will be discussed in terms of research and common equine practices. Research into equestrian knowledge and skills will be explored, and effective training techniques will be discussed in relation to training people. Finally the importance of generalization for both the owners and their horses will be covered including how to embed generalization within the study and what key aspects of generalization are relevant to float loading.

Overview of Equine Training Methods and Problem Behaviours

Horses have been trained for centuries using negative reinforcement or what is commonly referred to as pressure-release; the rider releases the pressure of their legs against the horse's side if the horse responds correctly to this pressure (Waran, McGreevy, & Casey, 2007). In this case the correct response to this aid is to walk forward or move sideways (Waran et al.). Traditional training methods all incorporate some degree of pressure that is released upon the correct response. Many alternative natural horsemanship methods of training still rely on the simple premise that a horse will respond correctly to pressure (Birke, 2007; McGreevy & McLean, 2007).

Owners can encounter problems such as unwanted behaviours when they don't release the pressure immediately they get the desired behaviour, or the horse doesn't respond correctly to negative reinforcement (McGreevy, 2007). The continued pressure may well punish the behaviour and appropriate behaviours may decrease when the pressure is not released immediately the horse responds correctly (J. J. Cooper, 1998; Fox, Bailey, Hall, & St Peter, 2012). A lack of knowledge about training methods and principles of behaviour can lead to incorrect use of both negative reinforcement and punishment in this situation (McGreevy & McLean, 2009). The common solution to incorrect responses is to increase the aversive stimuli (McGreevy & McLean). Depending on the situation this may entail pulling harder on the lead rope, driving the horse forward with a whip or using a rope around the hind quarters to pull the horse forward (Slater & Dymond, 2011). Any one or all of these techniques may be successful in some cases, which serve to positively reinforce the handler's behaviour - applying the aversive stimulus (Mills, 1998). In certain fear-inducing situations such as loading, the horse may come

to associate the float or the handler with these more aversive stimuli and be harder to load on subsequent occasions (Goodwin et al., 2009).

Due to the size of the horse any unwanted behavior can be potentially dangerous to both the horse and its owner (Hendriksen et al., 2011). The horse may refuse to move, start backing up, head shake or even rear up and the horse's welfare may be at risk if the owner continues to use punitive or aversive methods (McGreevy & McLean, 2009). Some owners may choose to send their horses away to a professional trainer for retraining. This has its disadvantages because the owner may not be involved in the process and the new behaviour may not generalize across locations or trainers (Stokes & Baer, 1977). The horse's welfare may be at risk even with a professional trainer if they lack the necessary knowledge and skills to deal with a range of problem behaviours (Warren-Smith & McGreevy, 2008). Lack of knowledge pertaining to the science behind training methods may create potentially dangerous situations for trainers, owners and horses if techniques are used incorrectly, possibly resulting in frustrated owners and dangerous horses (McGreevy, 2007). There is a need to find an evidence-based solution that is not only efficacious and ethical, but also applicable to owners and simple to train and use with equines (McGreevy).

Suggested Solutions

Train the correct use of negative reinforcement. One method would be to train people to use negative reinforcement correctly by improving their delivery and timing of reinforcement (McGreevy & McLean, 2007). Training the accurate use of negative reinforcement may improve the owner's skill in applying the technique. This in turn may increase loading behaviours, however, it fails to take into account the problem of escalating unwanted behaviours and how to measure or quantify pressure. Negative reinforcement is successful if the owner

pulls on the lead rope (an aversive) and the horse walks on to the float. The pulling must stop as the horse steps forward in order to reinforce the walk forward correctly (Heleski et al., 2008). Inappropriate behaviours may develop however when negative reinforcement is misapplied (McGreevy, 2007). These behaviours may occur if the horse has previously managed to avoid loading or the owner has been unable to maintain the pressure long enough to load the horse successfully (Slater & Dymond, 2011). Any inappropriate behaviour may be negatively reinforced inadvertently if the owner is unable to maintain or increase the aversive (Fox et al., 2012). If the horse runs backwards when the owner pulls on the lead rope, running back has been negatively reinforced (McGreevy & McLean, 2009). The aversive stimulus has been removed, making it more likely the horse will run backwards next time under similar conditions. The successful use of negative reinforcement in some situations may be dependent on the size and strength of the user (McGreevy & McLean). When we consider that a high proportion of horse owners are female this would suggest that a technique that relies on some degree of strength may put many women at a disadvantage (Birke, 2007; Visser & Van Wijk-Jansen, 2012). The danger of applying too much pressure is also a consideration and McGreevy and McLean suggest that horses are then susceptible to inadvertent punishment. The amount of pressure required and the precise timing of its release in order to reinforce the desired behaviour remain unmeasured and unquantified. The need for a technique that is easy to administer and teach to a range of horses and owners seems relevant for both horse welfare, and owner safety.

Train the use of positive reinforcement. Another suggestion would be to train owners to use positive reinforcement alone, using primary positive reinforcement as part of the process of trailer loading (Heleski et al., 2008). The horses could be encouraged to load by placing food rewards within the float or administering food rewards as they complete each step of the loading

procedure (Lee et al., 2001). Some trainers already advocate putting food in the float so the horse has access to it immediately upon loading, but there are two problems still unaccounted for with this method (Ferguson & Rosales-Ruiz, 2001). First the horse still requires handling by the owner or trainer who must enter the float during and after training. This puts any handler at risk from dangerous behaviour during this process. Second the horse may have performed any number of behaviours before receiving the food reward and therefore be unable to differentiate which behaviour gains reinforcement. The principle of positive reinforcement states that reinforcement must follow immediately after the desired behaviour (J. O. Cooper et al., 2007). The timing of the reinforcement is crucial and Karrasch (2000) gives a clear example of how positive reinforcement can be misapplied when picking up a horse's hoof for example (Karrasch et al.). Food rewards were given to a horse each time after it had put its hoof back down and gradually the horse stopped picking its hoof up. The owner was reinforcing the placement of the hoof on the ground - inadvertently training the horse to put its foot down faster and faster. Accurate timing of the delivery of the reinforcer is essential therefore this method may not be as straightforward as it first appears (Waran et al., 2007).

Train a combination approach. Another method based on the principle of positive reinforcement is target training, a common method used with marine mammals (Karrasch et al., 2000). Target training uses both classical and operant conditioning to train the desired behaviour of touching the target. The target is an object such as a marine float mounted on the end of a pole. The conditioned or secondary reinforcer is a standard clicker used by dog trainers. The clicker is classically conditioned by pairing the sound of the click with repeated presentations of food (Karrasch et al.). The target identifies where the horse's nose should be in relation to the target and is presented in front of the horse with the verbal cue target. Target training

incorporates both classical and operant conditioning. The classically conditioned clicker signals the delivery of the reinforcer following the operant response of touching the target. When the horse touches the target with its nose the trainer clicks to identify the correct response and then follows with food reinforcement (Karrasch et al.). By incorporating target training the owners would not have to handle the horse directly during training and can avoid being inside the float as training progresses. The size and strength of the owner is not an essential component in the successful use of target training, and rewards are simply withheld for incorrect responses. This use of differential reinforcement or reinforcement contingent upon the correct behaviour means only correct response are reinforced (Slater & Dymond, 2011). It is anticipated that inappropriate behaviours may decrease without any direct correction procedure (Ferguson & Rosales-Ruiz, 2001). Horses that are reactive or fearful of the float may respond more readily to target training because no aversive stimuli are used (Innes & McBride, 2008).

Timing issues associated with the use of primary reinforcement only could be improved with the use of the conditioned reinforcer in target training. The delay between the desired loading behaviour and the delivery of the reinforcer would be 'bridged' by the click, and the food reinforcer can be fed once the horse is secure in the float (Waran et al., 2007). Although timing is a crucial component in target training, with support and training it may be easier to click the correct behaviour, than be trained to release an unquantifiable pressure following the correct behaviour (Heleski et al., 2008; J. L. Williams, Friend, Nevill, & Archer, 2004). Float loading is potentially a frightening task that may affect the horse's ability to learn (Sankey, Richard-Yris, Leroy, Henry, & Hausberger, 2010). Using a secondary reinforcer would provide the horse with reinforcement opportunities before the float training begins. Any initial training that establishes

a history of positive interactions between the horse and the trainer may benefit future training sessions (Baragli, Mariti, Petri, De Giorgio, & Sighieri, 2011; Sankey et al.).

Current Training and Welfare Concerns

Ethology and Learning Theory

We demand many unnatural behaviours from horses, often placing them in vulnerable or frightening situations (Hendriksen et al., 2011; Murphy & Arkins, 2007). This may include situations where they are unable to see clearly, move freely, or flee from perceived danger (Ferguson & Rosales-Ruiz, 2001; Goodwin, 1999). Horses may display flight responses or other dangerous behaviours in order to escape these situations (Goodwin). The way these behaviours are dealt with may be cause for concern in terms of trainer safety and horse welfare (Waran et al., 2007). Many current training practices advocate the use of increased pressure or aversives to reduce problematic behaviours (McLean & McGreevy, 2010; Waran et al.). As a result horses may continue to display unwanted behaviours, learn to avoid fearful situations in the future, and become dangerous (Waran et al.). Some of these training methods are also potentially detrimental to the welfare of horses if misapplied. As stated earlier, increasing an aversive stimulus can become punishing or abusive (McGreevy & McLean, 2009). Punishing a horse's undesirable response to a fearful situation may inhibit learning the correct response and increase the motivation to escape (Waran et al.). If the technique doesn't reduce a behaviour then the technique is not a punisher, and its continued use may constitute abuse (McGreevy & McLean; Mills, 1998).

Goodwin (1999) discusses the role of ethology in understanding domestic horse behaviour such as aggression and the flight response. According to Goodwin wild horses generally avoid

confrontation and foster social groups with minimal aggression. Modern management practices however often entail large groups of horses being kept in confined areas which may lead to aggressive behaviours (Goodwin). It may be impossible to avoid this situation but relevant knowledge about equine behaviour may assist in minimizing aggression. Keeping horses in pairs, increasing access to food and water and increasing exercise, are solutions based on ethology (Goodwin). Traditional horse handling practices however, may not be so easily adapted to reduce unwanted behaviours. Knowing that horses don't like confined, dark spaces may help understand resistant flight responses when loading, but it won't help to manage these behaviours necessarily (Ferguson & Rosales-Ruiz, 2001; McCall, 1990). Natural horse behaviours have been observed and mimicked by trainers in many training systems (Birke, 2007). Owners may try to apply these techniques in order to load their horses. Some of these techniques have been shown to be dangerous and potentially abusive if used incorrectly (Birke). Many of these techniques are classed as Natural Horsemanship.

Natural Horsemanship

Natural horsemanship is a term used to describe methods that are based on natural horse behaviours (Birke, 2007). As Birke points out, Monty Roberts and Pat Parelli have popularized this approach to training and brought about a change in the perception of horse training for many owners. Unlike more traditional approaches to training, Natural Horsemanship encourages the trainer to take the horse's perspective and to use natural methods to communicate with their horse (Birke). Observations of wild horse behaviour has led to the development of several techniques that mimic these natural behaviours (Birke). Their success however often lies in the ability of the trainer to interpret subtle behavioural responses (Farmer-Dougan & Dougan, 1999; Waran et al., 2007). These attempts to use natural behaviours with horses is considered authentic

as Goodwin and colleagues point out, but may lead to frustration and poor results with the less experienced natural horseman. Waran (2007) describes the approach and retreat method used in a round pen in which the trainer uses an aversive stance to drive the horse away until the horse shows submissive behaviours such as chewing and lowered head. Once the horse indicates these submissive behaviours the trainer allows the horse to rest and come towards the trainer as a reward (Waran et al.). Waran notes that the trainer must observe and respond to a multitude of responses such as tail flicking, ear and eye movement, and stance in order to determine both his own and the horse's next move. Failure to make these observations can result in confusion for the horse and poor results for the trainer (Birke).

There are two common Natural Horsemanship methods used in loading horses. Driving the horse onto the float using a whip replicates the natural herd behaviours of horses (Ferguson & Rosales-Ruiz, 2001; Goodwin et al., 2009; Waran et al., 2007). Repeatedly working the horse around the float and allowing it to rest only when it goes inside the float is another natural behaviour noted by natural horsemen (Ferguson & Rosales-Ruiz). The horse may fail to learn the appropriate response if the trainer fails to recognize correct responses and punishes the horse, or doesn't remove the aversive in time (Waran et al.). Despite being considered a kinder approach to training than traditional training, Natural Horsemanship still relies on the correct application of negative reinforcement (Birke, 2007).

Both ethology and learning theory provide explanations for many practices within equitation according to McGreevy and McLean (2007, p.112). However an over reliance on ethological solutions may bypass important training distinctions (McGreevy & McLean). The use of round pen training, observing horse behaviour and mimicking the horse's response to another horse's signals fail to take into account stimulus-response chains or reinforcement history (McGreevy &

McLean). In the case of float loading, a relevant stimulus – response- reinforcer chain might be; see the float (stimulus) walk towards it (response) receive food (reinforcer). In contrast the horse may form fear based associations with the float from repeated negative experiences, through either operant or classical conditioning (J. J. Cooper, 1998). For example; see float (stimulus) stop (response) whip is applied (aversive). Cooper suggests that the distinction between classical and operant conditioning processes becomes blurred in the applied setting. Both serve to control behaviour and depend on the organism forming associations between events or stimuli (J. J. Cooper). In the above example the whip is applied within sight of the float suggesting the horse may associate the float with the whip, rather than the response of stopping (J. J. Cooper). Training systems that consider these factors may be a more effective and humane way to handle horses.

The notion of leadership and the use of anthropomorphic terminology is appealing to many owners (Goodwin et al., 2009; McGreevy & McLean, 2007). Yet this often misguided approach to horse handling may lead to the use of inappropriate or dangerous methods, for example expecting a horse to follow the trainer into a float after round pen training (Goodwin et al.). McGreevy and McLean state that Equitation Science 'uses learning theory to demystify and simplify training....'(p. 112). They point out that learning theory unlike the limited ethological solutions available provides a greater range of means for altering equine behaviour (McGreevy & McLean). Classical conditioning can assist with reducing fear and calming horses, habituation can reduce spooking behaviours, while operant conditioning can increase desirable behaviours such as being caught, standing for the farrier and loading into a float (Ferguson & Rosales-Ruiz, 2001; Innes & McBride, 2008; Slater & Dymond, 2011).

Welfare Considerations and Traditional Training

As discussed earlier when using negative reinforcement problems can arise when horses don't emit the correct response due to any number of reasons. These reasons include fear, lack of understanding of the required behaviour, and pain (Waran et al., 2007). Owners may increase the pressure being applied, however this may become either abuse or punishment if the owner is inexperienced or unaware of its correct use (McGreevy & McLean, 2009). Owners may misapply a technique because they lack knowledge about it or they are unaware of an alternative method or they have been misinformed by professionals (Warren-Smith & McGreevy, 2008). Warren-Smith and McGreevy (2008) noted that Australian equestrian coaches lacked knowledge about basic equine training methods and described behavioural terms incorrectly. To encourage consideration of equine welfare and the use of less aversive methods during training, information has to be readily available, easy to use and correctly disseminated, (Visser & Van Wijk-Jansen, 2012).

Training knowledge. Equine training and welfare concerns are better understood within the equine community with the advent and growth of the International Society of Equitation Science (ISES) (McLean & McGreevy, 2010). The society disseminates information regarding ethical training and management of equines based on learning theory and scientific research (McGreevy & McLean, 2007). Horse welfare underpins the society's vision for developing a systematic approach to equestrian language and training methods based on learning theory. The society's annual conferences provide a global forum for discussion, research and networking for equestrians, sharing knowledge and skills to improve equine welfare. Improving equestrians' knowledge and skills is likely to improve horse welfare, however identifying and reaching these horse owners may be problematic (Visser & Van Wijk-Jansen, 2012). Finding out what sources

people use for equine related information formed part of an online survey in the Netherlands (Visser & Van Wijk-Jansen). Visser and Van Wijk-Jansen wanted to find out the types of people involved with horses, their current knowledge about horse management and welfare, and how they accessed equine information. Equine knowledge was considered in terms of conceptual and procedural knowledge – viewing it as part of a continuum (Visser & Van Wijk-Jansen). However as Visser and Van Wijk-Jansen (2012) point out, knowing that weaving is a stereotypic behaviour doesn't mean knowing that the horse requires more time at liberty. The study attempted to divide these horse enthusiasts into distinct groups based on their responses, suggesting that future research might consider how best to provide information to these groups (Visser & Van Wijk-Jansen). The main reported source of information was fellow equestrians, followed by veterinarians and farriers (Visser & Van Wijk-Jansen, p. 295). The results of the survey suggest that targeting veterinarians and farriers for further training might help to provide accurate information to owners (Visser & Van Wijk-Jansen). Nonetheless gaps in individual owner's knowledge and skills might still exist due to lack of conceptual and procedural understanding (Warren-Smith & McGreevy, 2008).

The dissemination of training knowledge and skills to various groups could be considered easier with the internet, social media and other forms of technology (Birke, 2007). However knowing what is the most appropriate and relevant information to use may be difficult and even overwhelming for owners. How do people choose what method to subscribe to, or what is the correct advice? Applied behaviour analysis and evidence-based practice may provide some assistance in choosing and implementing the most appropriate training plan.

Applied Behaviour Analysis (ABA)

Applied behaviour analysis is concerned with changing socially significant behaviours, by first identifying the environmental variables that influence these behaviours (J. O. Cooper et al., 2007). Behavioural-analytic techniques derived from the principles of behaviour are used to plan an intervention (J. O. Cooper et al.). The behaviours under observation are measured before, during and after the intervention and visual analysis of data collected provides evidence that the intervention was most likely responsible for any behavior change (J. O. Cooper et al.). Human behavioural studies using small N, within-subjects designs are typically seen in Applied Behaviour Analysis research. Treatments that are empirical, effective, efficient and evidence-based provide practitioners with the best current practice (Parsons, Rollyson, & Reid, 2012). There are several advantages to using the Small N design that may provide a robust method for monitoring and evaluating animal behaviour change programmes (Butler, Sargisson, & Elliffe, 2011). Butler et al. identified two characteristics of small-N research that may make it easier to conduct research with equines and their owners.

1. Animals are not singled out to be in a control group because all subjects are exposed to the treatment and serve as their own control. The individual's behaviour is compared across baseline (A), treatment (B) and post treatment (C).
2. The ABC design means behaviour is evaluated over time for its effectiveness and maintenance (Butler et al.).

Small N studies allow other researchers or practitioners to note results across replicated studies with various individuals, in different settings. These replications showing consistent results assist in determining the likely success of the intervention with other individuals.

There are comparatively few studies on horses in applied settings that focus on positive reinforcement and even fewer on loading (Waran et al., 2007). Only two of the four studies on loading could be considered behavioural studies using small N designs. There appears to be a need for more small N studies on the application of positive reinforcement to support equine training problems in the applied setting.

Welfare Research

Research has demonstrated that lack of environmental control can impact on the welfare of animals in captivity, possibly leading to behavioural issues (Brando, 2012). This suggests that training welfare considerations need to allow the animal some degree of control during the training process (Baragli et al., 2011). Generally horses have very little control over their environment through current management practices (Birke, 2007). They are housed individually, often restricted physically from other horses, and fed at intervals rather than left grazing at liberty (Visser & Van Wijk-Jansen, 2012). Traditional horse handling using negative reinforcement usually involves directing the horse's movement using an aversive stimulus (Goodwin et al., 2009). For many horses, handling may be coercive and punishing if they display unwanted behaviours (McGreevy & McLean, 2009). Control over the horse may frequently be exerted through equipment and gadgets that serve to restrict and manipulate the animal (McLean & McGreevy, 2010). The response to flee a dangerous situation is prevented due to the restrictions of the lead rope, or bridle and bit (Waran et al., 2007). The horse's learning may be impaired and its welfare compromised if it is actively avoiding something fearful and an aversive stimulus is applied (Brando). Brando states the more an animal tries to avoid a situation, the more likely it is that its welfare is being compromised. These avoidance responses give the handler important information about the animal's motivation to participate.

Brando suggests it is the handler's responsibility to consider how to increase compliance. By changing antecedent events, increasing reinforcement, and adding or removing certain environmental stimuli the trainer is considering the horse's perspective (Brando). The choice of training method therefore may create an opportunity for the horse to exercise some degree of control over its environment. The use of a science-based approach to training may also mean owners have more control over their horses and ultimately their horses' welfare (Brando; Waran et al.).

Defining behaviour problems. Whatever training method used, determining the likely cause of behavioural problems is an important consideration when planning an intervention for inappropriate behaviour (J. O. Cooper et al., 2007). Horses may suffer unnecessary pain and discomfort because the cause is not investigated fully (Waran, 2005). Waran suggests that confusion as to what is a behavioural problem and what is a physical problem may lead to horses being deemed unfit for use. She refers to five case studies involving horses that were presented for a veterinary examination due to their problem behaviour. All were considered by their owners to be suffering a physical problem. The behaviours included bucking, rearing, kicking and head shaking all potentially linked to physical concerns such as poorly fitting equipment and in the case of mares, being in season (Waran). A full veterinary examination revealed no clinical explanation for their behaviours. All horses then underwent systematic training based on behaviour-analytic techniques (Waran). The techniques used included de-sensitisation and counter-conditioning and the interventions successfully reduced all problem behaviours within an average of 6.4 days (Waran, p. 71; Wolpe, 1962). The training was conducted at a behavioural clinic by staff and it is not clear if the owners were informed of the training procedures used. Waran (p72) noted that the owners did not consider that their training may

have contributed to the problem. This suggests that remedial training by an expert, while worthwhile, may not be a long-term solution. Although the training was tailored for each horse and owner, if the owner was not involved or informed about the procedures it increases the likelihood that the inappropriate behaviour will return. Without new information the owner is more than likely going to continue their poor training. Owners completed a questionnaire after the training and follow up calls were carried out up to 6 months later. According to the study, behaviour was maintained across this time. A follow up after a year or 18 months might provide a better assessment of maintenance over time. A year to 18 months would allow time for the problem behaviour to return especially if the owner didn't change their training methods. The results of this study support the earlier claims that lack of correct knowledge of behaviour techniques and training practices can lead to welfare concerns and potential wastage of horses (Visser & Van Wijk-Jansen, 2012).

Waran (2005, p. 67) advocates a need for an equine-centred approach to behaviour problems. Both natural behavioural responses and evidence based training methods need to be considered when seeking training solutions (Waran). Combining applied ethology and theories of learning may assist trainers to train effectively within the confines of a man made environment thereby improving equine welfare (McGreevy & McLean, 2007). If we know how horses behave naturally under certain conditions we are able to adapt the environment, incorporate appropriate techniques and minimize stress for both horses and handlers (Hendriksen et al., 2011).

Behavioural Research and Equine Training Research

Horses are often subjected to coercive methods in an attempt to control their inappropriate behaviour (Baragli et al., 2011). Research however has indicated that positive reinforcement training can be beneficial for controlling both targeted and untargeted behaviours in horses

(Baragli et al.; Ferguson & Rosales-Ruiz, 2001; Innes & McBride, 2008). Reducing or increasing behaviours using positive reinforcement enables the trainer to achieve control over behaviour through stimulus control without causing fear or aggression through aversive techniques (Ferguson & Rosales-Ruiz). Stimulus control refers to the occurrence of a behaviour under certain conditions in the presence of certain stimuli only (J. O. Cooper et al., 2007). The trainer reinforcers the desired behaviour in the presence of the chosen stimulus and not in its absence, using a process called differential reinforcement (Ferguson & Rosales-Ruiz). Trainers can shape closer approximations to the desired behaviour using differential reinforcement (Slater & Dymond, 2011). Unlike more coercive methods, positive reinforcement reinforces new behaviours, encouraging explorative behaviour in the horse (Baragli et al.). Increasing an aversive to obtain control over behaviour means the horse may be punished inadvertently for trying new behaviours (Waran et al., 2007).

Positive Reinforcement

Research suggests that horses learn in much the same way as other species through stimulus-response - reinforcement chains (McCall, 1990). Various studies have explored how the horse learns, including habituation, discrimination and procedural and conceptual learning (Christensen, Zharkikh, & Chovaux, 2011; Dougherty & Lewis, 1991; Gabor & Gerken, 2010). McCall however commented on the need for more studies that are relevant to current equestrian practices. Predominantly negative reinforcement is used for training horses and yet research generally employs primary positive reinforcement (Murphy & Arkins, 2007). Murphy and Arkins suggest this makes it difficult to interpret the results of many studies, supporting McCall's claim that these results lack relevance within the equine community. This disparity between methods used in research and general equine training may heighten people's reluctance

to accept and apply new techniques based on scientific findings (McGreevy, 2007). Investigating negative reinforcement experimentally may assist people to work more effectively with negative reinforcement, but it fails to address some of the behavioural problems associated with negative reinforcement. These include potential for abuse, the likelihood of horses resisting under stressful situations and the degree of choice available to the horse (Brando, 2012; McGreevy & McLean, 2009). A key question for researchers and owners to consider is - just because everyone is using the procedure are alternative, less aversive methods ignored? (Birke, 2007).

McGreevy (2007) questions the safety and effectiveness of using positive reinforcement alone for riding, stating it is rarely used in equitation. The use of positive reinforcement alone is probably highly impractical for riding purposes for two reasons. First the principle of positive reinforcement states that positive reinforcement must follow immediately after the correct response (J. O. Cooper et al., 2007). Feeding the horse from the saddle immediately after the correct response would be very difficult (Waran et al., 2007). Second, horse handling generally involves some sort of negative reinforcement due to the nature of the equipment used. Lead ropes, saddles and bridles all imply the application of some sort of aversive stimulus. Despite this reliance on negative reinforcement, studies suggest that it may be more effective to use positive reinforcement in some situations (Hendriksen et al., 2011; Innes & McBride, 2008). For example when horses have a history of mistreatment or fearful associations with some stimuli any addition of an aversive stimulus may increase stress responses (Innes & McBride). It would seem prudent to consider applying positive reinforcement when approaching specific behavioural issues that may be confounded by negative reinforcement (Innes & McBride).

Reinforcers. The successful application of positive reinforcement involves a primary reinforcer or unconditioned stimulus (US) and may include a secondary reinforcer or conditioned stimulus (CS) (J. O. Cooper et al., 2007). The terms US and CS are common in experimental literature, however for the purposes of this study the terms primary and secondary reinforcer will be used. A primary reinforcer is considered anything that the animal needs, and food is considered an easy to administer primary reinforcer. A secondary reinforcer gains its reinforcing qualities through association with a primary reinforcer and a clicker is a commonly used secondary reinforcer. There is some debate as to whether the secondary reinforcer takes on the intrinsic value of the primary reinforcer or if it serves as a signal for reinforcement (Davison & Baum, 2010; B. A. Williams, 1994). Davison and Baum noted it is generally accepted that the secondary reinforcer doesn't take on the same value of the primary reinforcer so much as it does signal or indicate that a primary reinforcer will follow its presentation. This is an important distinction for animal trainers because it allows a series of behaviours or steps to be trained in succession, at a distance, without stopping. Each behaviour can be 'marked', signaling the eventual delivery of a reinforcer without the need to be close to the animal (Davison & Baum; B. A. Williams).

The contingencies for both the primary and secondary reinforcer are central to successful use of the clicker in training. The contingency refers to the association between events or stimuli, for example the sound of the click and the delivery of the primary reinforcer (stimulus - reinforcer) or the occurrence of a behaviour and the delivery of reinforcement (response - reinforcer) (Mills, 1998). Contiguity of both events and the reinforcement that follows are also important factors in training (Mills). For example if the click immediately follows inappropriate behaviour, this

behaviour may become associated with reinforcement. The closer two events or stimuli are in space and time, the stronger the association (J. O. Cooper et al., 2007).

The use of a secondary reinforcer allows the trainer to identify and reinforce individual steps in a shaping procedure (Karrasch et al., 2000). The secondary reinforcer is applied in a similar manner to verbal praise in a human shaping procedure. The secondary reinforcer marks the correct step and is followed by food which is the primary reinforcer. Float loading is a series of discrete steps that can be clearly marked by the clicker from a distance enabling the trainer to remain at a safe distance from the horse if required. The trainer would have to be close to the horse and be able to administer the food immediately following the correct behaviour using a primary reinforcer only. Immediate reinforcement is not always possible when loading horses and it may not be safe to be inside the float to feed the horse. A secondary reinforcer may enable trainers to improve their timing during training. As stated earlier using primary reinforcement only has its disadvantages. Karrasch describes an example of how a primary reinforcer can be misapplied during a hoof picking training session. The use of a clicker would have enabled the owner to click as the hoof came off the ground as the clicker can be easily held in one hand using the wrist strap.

Researchers have noted that there appear to be few experimental studies involving horses and even fewer that consider the applied application of positive reinforcement with a secondary reinforcer (Dougherty & Lewis, 1991; Miyashita et al., 2000). Williams (2004) conducted a simple operant task using a primary reinforcer only, versus a secondary and primary reinforcer. Two groups of horses were trained to touch a target. One group received either a secondary followed by a primary reinforcer and the other group received a primary reinforcer only. Continuous and variable ratios of reinforcement were in effect for both groups. Following

successful training, extinction trials were conducted for a maximum of 60 seconds to see how long the target touching behaviour continued without the addition of a primary reinforcer. The group of horses trained with the clicker still received the click in extinction trials but no primary reinforcer was given (J. L. Williams et al.). Williams and colleagues concluded that, in relation to their study, training time and extinction effects were similar across both methods and schedules of reinforcement didn't appear to effect results. The authors reported that there was no difference in the time it took for horses to learn the target behaviour or in the number of trials to extinction. These findings however, don't take into account two important advantages of a secondary reinforcer that aren't always obvious to non-equestrians. First a secondary reinforcer enables the trainer to train at a distance and mark the desired behaviour without having to be close to feed the horse immediately. Second it allows the horse to perform a series of behaviours under saddle before receiving the primary reinforcer. The researchers allowed a 5 second delay between the click and the delivery of the primary reinforcer to account for the likely delay in an applied setting between the click and the delivery of the primary reinforcer. There is no further mention however of the practical application of their results. If delays are expected in the applied setting then it would appear secondary reinforcers are useful and the clicker may enhance training in the applied setting by compensating for this delay.

Factors influencing positive reinforcement. Schedules of reinforcement, reinforcement history, and identifying reinforcers are three additional factors that may impact on the successful application of positive reinforcement. An animal's previous experience of reinforcement under certain schedules or conditions is referred to as its reinforcement history and is likely to affect future responding under those same conditions (Pipkin & Vollmer, 2009). Schedules of reinforcement can be fixed or varied, according to time or number of responses required before

reinforcement is given (J. O. Cooper et al., 2007). For example a variable interval schedule or VI3 would deliver reinforcers dependent on an average time lapse of 3 seconds. A variable ratio schedule or VR3 would deliver reinforcers after an average of 3 responses (J. O. Cooper et al.). Fixed schedules state the time period or exact number of responses before a reinforcer is delivered. Variable or intermittent schedules are considered more resistant to extinction than continuous schedules as it is harder for the organism to determine when a reinforcer will be delivered (J. O. Cooper et al.). Continuous schedules are recommended for new and difficult tasks (J. O. Cooper et al.). This would suggest that a strong reinforcement history is then established before moving to intermittent schedules. Float loading could be considered a difficult task for some horses due to their lack of appropriate responses and their previous loading experience. In order to enter a float a horse must perform unnatural behaviours, walking into a small, confined space with no visible escape (Ferguson & Rosales-Ruiz, 2001). Using a continuous reinforcement schedule especially for problem loaders may be more effective initially to increase the rate of responding and to achieve an approximation of the appropriate behaviour quickly (J. J. Cooper, 1998; Mills, 1998). Without a secondary reinforcer, some loading behaviours would go unreinforced in training sessions with a variable schedule of reinforcement. The addition of a secondary reinforcer allows every appropriate behaviour to be marked, while still providing primary reinforcement on a variable schedule. For animals who have experienced poor handling or trauma associated with certain stimuli creating a new reinforcement history may be very important before any further exposure to the new environment (Innes & McBride, 2008; Sankey et al., 2010). By training stimulus control using certain stimuli that will be found in the new environment, reinforcement can be given for all appropriate behaviours in the

presence of these stimuli. For example, training horses to touch a target and gain immediate reinforcement before training them to approach a fearful object using the target.

Typically in the applied setting, before using positive reinforcement as a treatment, both a preference test and reinforcer assessment would be conducted (J. O. Cooper et al., 2007). Preference tests have been conducted with horses but these are time consuming and may not be essential to the successful use of positive reinforcement (Armistead, 2009; Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). Some studies have noted that horses didn't appear interested in the food being used (Hendriksen et al., 2011). This lack of interest in behavioural terms would suggest the food was not sufficiently reinforcing for that particular behaviour, therefore responding may decline as a result (Ninomiya, Mitsumasu, Aoyama, & Kusunose, 2007). Other studies used food based on its availability and ease of use rather than the horses' preference (Fox et al., 2012; Hendriksen et al.). These observations are important when considering the results of the studies, and when attempting to replicate the procedure. For example an increase or decrease in behaviour may be due to the effects of the chosen reinforcers rather than the training procedures (Ninomiya et al.).

Comparing positive and negative reinforcement. Heleski (2008) compared the use of negative and positive reinforcement when training horses to walk over a plastic sheet. The hypothesis was the horses trained with both positive and negative reinforcement would learn the task faster than those trained with negative reinforcement alone. Their design demonstrates an understanding of natural horse behaviour and the application of learning theory to improve a common training situation involving a frightening stimulus. The task was considered novel and frightening so to avoid further stress through separation anxiety, horses were trained in view of another horse. Two groups of horses were trained with either just negative reinforcement (NR)

or with negative and positive reinforcement (NR/PR) to compare the time taken to learn the task. The training lasted for one session of up to 10 minutes and behavioral measures were assessed during the approach only. The researchers noted that the combined training horses appeared easier to calm down once they were on the plastic, stating that recording behaviours on the tarp would have provided relevant data. The results suggested no significant differences between the two methods in the time taken to learn the task however the use of positive reinforcement may have improved handler safety (Heleski et al.).

A small N design may have been more appropriate in this research. A baseline procedure would have provided data on current behaviours before training and enabled horses to be selected based on specific behavioural criteria. For example older horses crossed the plastic more readily regardless of training method and may have been able to do so before training. It is difficult to determine whether the task was novel or not for these horses. Baseline and post training data may have shown a more significant difference between the two methods, allowing behaviours to be measured comparative to baseline.

The study design may not have allowed for an accurate comparison to be explored for two key reasons.

- Negative and positive reinforcement were combined for one group of horses.
- No secondary reinforcer was used and it was assumed that the trainer delivered the primary reinforcer immediately following the release of pressure (Heleski et al., 2008).

There are two likely problems with combining negative and positive reinforcement in a frightening situation without conditioning a secondary reinforcer. First the horse may display unwanted behaviours at the onset of the frightening event (Brando, 2012). The application of negative reinforcement, which by definition is applied first, may negatively reinforce these

behaviours if the horse successfully avoids the event (McGreevy & McLean, 2009). Second, if the horse shows avoidance behaviours approaching the plastic, there is no opportunity to deliver reinforcers. The addition of a secondary reinforcer, conditioned before training may have shown a difference between the two methods. Using a clicker during training means each individual step can be marked and reinforced, reducing the likelihood of rushing and fearful responses. With no history of positive reinforcement before the training, it may be difficult to obtain compliance when the horse is already fearful (Innes & McBride, 2008). The horses in the NR only group tended to rush across the plastic however the NR/PR horses were more easily calmed as they crossed the plastic. Using a secondary reinforcer during the approach may have enabled the trainer to reinforce each step forward with a click rather than trying to feed the horse. The timing of the delivery of the primary reinforcer was considered important to avoid luring the horses across the plastic (Heleski et al., 2008). Poor timing with the release of negative reinforcement was also important. In this instance it was potentially dangerous for the trainer to either increase pressure or not release it correctly (Hawson, McLean, & McGreevy, 2010). The horse may have jumped onto the plastic or pulled away. This suggests that inexperienced handlers may be at less risk using a combination approach than using negative reinforcement alone (Heleski et al.). The study stated the trainer was 'very skilled in handling horses', indicating the potential reactive behaviours that may occur with the use of negative reinforcement (Heleski et al., p. 217).

The researchers noted that older horses crossed the plastic more readily regardless of the training method, and suggested that the horses trusted their handler and had greater experience (Heleski et al., 2008). Habituation may also explain the older horses' response to the frightening tasks (Waran et al., 2007). Older horses have likely experienced enough frightening stimuli that

they no longer signal any potential threat. Frightening float loading experiences may establish a strong reinforcement history for avoidance, especially if the horse has avoided loading as a result of its behaviour, as noted earlier.

Several studies have noted the importance of improving owner and trainer knowledge with regards to improving training and horse welfare (Brando, 2012; Visser & Van Wijk-Jansen, 2012; Waran et al., 2007). This study raised a question that further supports the importance of informing owners about any training procedures used with their horses. Heleski and colleagues (2008) suggested that owners might ask whether the horse learnt the task or was dependent on the reinforcer. This suggests the owners are confused with the principle of reinforcement in general as the same question applies to negative reinforcement. For example an owner might ask, did the NR horses learn the task or would they always require NR? This point demonstrates that owners require additional training if they are to assimilate and practice new knowledge It also provides further support for training both conceptual and procedural knowledge (Visser & Van Wijk-Jansen). Overall while the study noted the benefits of positive reinforcement it seemed to underplay the general potential for it to be applied safely by inexperienced handlers (Heleski et al.) .

Hendriksen, Elmgreen and Ladewig (2011) compared negative reinforcement (NR) and positive reinforcement (PR) methods during float training. The study compared the effect of using the two methods to increase loading behaviours in two groups of horses. Baseline heart rates were taken for all horses both during loading with the owner, and when the horse was stationary in a familiar stable (Hendriksen et al., p. 263). Discomfort behaviours were measured during training based on direct observation and included tail whipping, whites of the eyes showing and widening of nostrils. Avoidance behaviours were classed as avoidance of training

or, no response to the trainer's signals (Hendriksen et al.). The horses were divided into two groups and randomly assigned to either training method. The PR procedure included using a clicker and target training. For the NR procedure a whip was applied by tapping on the shoulder if the horse didn't respond to the pressure of the lead rope. After initially training the horses to move forward and backward and to stand still, the horses were walked across a piece of plastic before being considered trained for float loading (Hendriksen et al., p. 263).

Hendriksen et al (2011) noted that during baseline some owners were not consistent or accurate in their cues. The researchers stated that owners' anxiety may have impacted on the horses' behaviour. A calm trainer giving clear signals makes it easier for the horse to 'learn' the desired response (Hendriksen et al.). Although the study noted important differences between NR and PR such as more discomfort behaviours and higher heart rate in the NR group, by comparing the two methods it suggests that one is right, or better than the other and one is wrong or less effective than the other. In order to encourage owners and trainers to increase their knowledge about training, it may be more effective to demonstrate the successful application of the new techniques rather than berating their current system (Birke, 2007; Reid & Parsons, 2002).

Williams (2004) states that clicker training has both supporters and opponents within the equine industry. Opponents may see the clicker as gadget for training tricks and not appropriate for equestrians. However Williams' appraisal of clicker opponents seems to be confusing. Unlike the study the researchers don't differentiate between opposition to the addition of a reinforcer, and opposition to the use of the clicker and reinforcement. People may be opposed to the use of the clicker, but not the use of positive reinforcement. As pointed out earlier there is much confusion surrounding terminology and techniques used with horses (McGreevy, McLean,

Warren-Smith, Waran, & Goodwin, 2005). It may be that people support the use of positive reinforcement, but just don't wish to use a clicker. The researcher is of the opinion there must be a clear distinction between clicker training and positive reinforcement. Positive reinforcement refers to the procedure of reinforcing appropriate responses. The clicker is the secondary reinforcer and is a training tool and as such can be replaced by a whistle or word (Karrasch et al., 2000). The secondary reinforcer is used during training and faded out once a behaviour is under the stimulus control of an appropriate cue. The suggestion that this training tool is a hindrance in events or at the race track is due to misinformation about the tool. The behaviour should be under stimulus control at this stage and if not, the horse should not be at the event. Equestrian opponents to clicker training may associate it with trick training suitable for dogs and other species. It may be seen as indiscriminate feeding of treats (Dougherty & Lewis, 1991). Clicker training is a systematic training process that requires a high degree of trainer responsiveness to observe and reinforce the desired behaviour, allowing for an equally high degree of accuracy in training (Karrasch et al.). Positive reinforcement is the behavioural principle applied during clicker training (J. O. Cooper et al., 2007). Disseminating correct information about the procedures and behavioural principles involved and demonstrating relevant applications may assist in alleviating equestrians' concerns about the clicker.

Hendriksen's findings lead the researchers to suggest that only very experienced trainers should use NR because of the potential welfare concerns associated with its use (2011). I believe some behaviour-analytic techniques may be easier to learn than trying to refine the use of negative reinforcement or recognize the subtleties of species-specific behaviours. Studies have demonstrated that horses respond to positive reinforcement but it would appear that often the focus is on the effectiveness of positive reinforcement in comparison to negative reinforcement,

rather than on its merit alone (Hendriksen et al.; McGreevy, 2007). For a traditional equine world, the debate about which method is best is a moot point (van Weeren, 2008). Research has already indicated that knowledge about training is limited so adding further discussion about which is best may add to the confusion (Warren-Smith & McGreevy, 2008). An alternative approach would be to provide evidence that owners can be trained to use a less aversive technique alongside their normal routine. A research project that provides a systematic way to assess, measure and plan an intervention for owners to use might be more appealing if it solves a common problem. This would enable owners and trainers to improve their skills while demonstrating a relevant and successful problem solving procedure (Visser & Van Wijk-Jansen, 2012).

Practical Applications for Positive Reinforcement

Positive Reinforcement and Horse and Handler Interaction

The main concern with the application of negative reinforcement is the timing of the release or removal of the aversive stimulus (McGreevy, 2007). For example if the rider doesn't remove the pressure of their leg after the horse walks on, they are not applying negative reinforcement correctly and are in danger of punishing the desired behaviour if they continue to apply this pressure (McGreevy & McLean, 2009). Another concern is, in order to gain compliance, it may be necessary to increase the aversive stimulus (Hendriksen et al., 2011). The aversive stimuli may become associated with the trainer or owner through classical conditioning and impact on the relationship between horse and handler (Mills, 1998). The use of positive reinforcement is infrequent among equine trainers, however applied studies have demonstrated unwanted behaviours can be significantly reduced with the application of positive reinforcement and the differential reinforcement of desired behaviours (Fergusson & Rosales- Ruiz, 2001; Fox, 2012:

Slater & Dymond, 2010). Several studies have suggested that the use of positive reinforcement may help to improve the interaction between horse and handler both during training sessions and in other situations (Ferguson & Rosales-Ruiz; Heleski et al., 2008; Hendriksen et al.; Innes & McBride, 2008). Horses may associate the owner with reinforcement and enjoyable activities (Ferguson & Rosales-Ruiz). The clicker and target may also form part of this association and become a signal for the opportunity to earn reinforcement (Reid & Green, 2005).

The application of positive reinforcement with a conditioned reinforcer and target training may create an enriching experience for the horse by providing primary reinforcement for the desired behaviour (Brando, 2012). According to Brando, the desired consequences of reinforcement may benefit both animal and handler. It has been noted for example that some animals trained with PR will participate in medical procedures voluntarily (Brando). The increased positive interactions with humans may also reduce stress and aggression under difficult handling procedures such as feet trimming and rehabilitation (Brando).

Horses are required to stand frequently for long periods for veterinary examinations, the farrier and for grooming. Many of these procedures involve exposure to aversive handling if the horse is non-compliant (Brando, 2012). Slater and Dymond (2011) used positive reinforcement in a changing criterion design, to increase the length of time a horse would hold its feet up for trimming. Both duration of foot holding and inappropriate behaviours were measured following baseline (Slater & Dymond). Training consisted of reinforcing the horse for gradual increases in duration of foot holding, using a clicker followed by food reinforcement. The horse's correct response was reinforced immediately by the clicker and followed by food on a VR2 schedule. The results showed a marked reduction in inappropriate behaviours once training commenced. The behaviour generalized to the horse's owner and was maintained a week later, however future

research might consider a longer maintenance period and generalization to the farrier, for example. This study demonstrates the application of differential reinforcement in increasing desired behaviours and reducing unwanted behaviours without the use of aversive stimuli (Slater & Dymond). It also shows that systematic training using both secondary and primary reinforcement can be applied easily within the applied setting involving short sessions with one handler.

Innes and McBride (2008) compared the use of negative reinforcement, and positive reinforcement with a secondary reinforcer to rehabilitate ponies with a history of maltreatment. This study covered some difficult but essential handing procedures. The two groups of ponies were trained to lead, stand for grooming, complete an obstacle course and load into a trailer (Innes & McBride, p. 359). The ponies' heart rate was measured before, during and after the training sessions. Heart rate and behaviour were measured during a separate obstacle course in which the pony was turned loose and the researcher sat near an inverted umbrella suspended from the ceiling. Observed behaviours were broken into four groups; general behaviours, tail position, vocalization and novel object with an agreed criteria for each group. The latency to touch and approach the object or trainer was also recorded (Innes & McBride, p. 360). A time budget of general behaviours was conducted twice daily before, and during the training programme. The researchers used instantaneous scan sampling every 5 minutes over 8 hours monitoring behaviours such as alert/non alertness, sleeping, feeding and movement (Innes & McBride, p. 361). The researchers didn't explain why in-session behaviours were not recorded. These within session behaviours may have given a clearer indication of the benefits of using positive reinforcement when compared to baseline behaviour. The time budget measures were outside of the training sessions where other variables were operating. This data is of interest

because it provides some degree of external validity and Fergusson and Rosales-Ruiz (2001) and Slater and Dymond (2011) cited anecdotal reports by owners of improved horse behaviours outside of the training sessions. Horses were easier to catch and approached the owners more readily (Ferguson & Rosales-Ruiz; Slater & Dymond). None of these behaviours were targeted during training. Both studies commented that these side effects were important but further research is needed to explore and verify these findings (Ferguson & Rosales-Ruiz; Slater & Dymond).

The results of the obstacle course demonstrated the reinforcing effects of PR on approach behaviours (Innes & McBride, 2008). The ponies tended to approach closer and faster to the umbrella and trainer than the NR ponies (Innes & McBride). These approach behaviours may be interpreted as voluntary behaviours because the pony was free to move away from the umbrella within the arena. This supports the previous suggestions that positive reinforcement can create opportunities for choice in training and improve human/horse interactions (Baragli et al., 2011; Waran et al., 2007). In contrast the NR ponies tended to avoid the umbrella and trainer and according to Innes and McBride (p. 367) remained reactive throughout the programme. This avoidance of human contact as a result of the chosen training method would suggest that NR is not the best method to use for fearful or reactive horses (Innes & McBride). It appears that horses may fail to adapt to fearful and frightening stimuli due to the training method rather than for a physical or clinical reason (Innes & McBride; Waran et al.). Positive reinforcement may serve to encourage explorative behaviour such as approaching people and foreign objects by choice (Ferguson & Rosales-Ruiz, 2001; Innes & McBride).

Baragli and colleagues (2011) trained two groups of horses under different training conditions to accept handling, grooming and the saddle and bridle. Group A were trained loose in an

enclosure and had the option of responding to the trainer. The horses in Group B were trained in a restrained environment. The restriction made the required response the only available response. Both training options involved negative reinforcement and the difference was the time allowed to process the stimulus. In Group A the trainer's actions were based on the horse's responses to each stimulus. Each horse had time to approach and respond to the stimulus before the trainer proceeded with either brushing or touching the horse. In Group B the horses were presented with each stimulus and were not able to avoid contact or escape. Two tests were carried out to assess the effect each training method had on the horses' responses to a strange person, and to being groomed and handled. The familiarization test was similar to the one used by Innes and McBride (2008). The horses from Group A showed more approach behaviours towards the strange person during the test whereas Group B showed more avoidance behaviours. Overall the results indicate that Group A's training led to more positive attention and responsiveness towards the stranger whereas Group B showed attention but with more resistant and avoidance behaviours (Baragli et al.). Group A horses experienced more choice in their training, and their approach and explorative behaviors appear similar to the behaviours of the PR ponies in Innes and McBride's research. The results of Group A's training also lends support for a horse-centered approach to training (Waran, 2005). Allowing horses more control over their environment may improve training welfare and human-equine interactions (Brando, 2012; Innes & McBride). These findings indicate that training impacts on human-equine interactions, and behaviours outside of the training environment; and encouraging explorative behaviour may be useful in training horses to perform frightening tasks (Baragli et al.; Innes & McBride).

Sankey and colleagues (2010) explored horse and human interactions, and the effects of positive interactions between young horses and humans in building relationships. Yearlings with

no previous handling were habituated to the halter and lead before training, with no rewards (Sankey et al., p. 870). The horses were randomly divided into two groups and underwent a series of training procedures using either positive reinforcement or no rewards. The researchers state that negative reinforcement wasn't used however as noted earlier the very nature of horse handling suggests that some degree of pressure was applied during leading (Sankey et al.). The results show that the yearlings trained with the addition of a food reward demonstrated more approach behaviours during a relationship test with a novel person.

There are three key points raised by these studies that support the use of positive reinforcement as a rehabilitating training technique. First, the horses trained with positive reinforcement inclined to generalization their responses across environments and handlers. This suggests that positive reinforcement, unlike natural horsemanship which may become context specific, may also help human-equine interactions across different environments (Waran et al., 2007). Operant conditioning with positive reinforcement may enable the owner to train their horse to generalize more readily across different situations and handlers (Sankey et al., 2010). As stated above the ponies trained with positive reinforcement showed more approach/explorative behaviours towards foreign objects and different trainers outside of the training sessions when given control over their environment (Innes & McBride, 2008). Second, positive reinforcement allows the horse to control access to reinforcement (Slater & Dymond, 2011). Reinforcement is gained through discrete behaviours that are easily differentiated and the horse's responses are shaped without having to apply aversive stimuli (Slater & Dymond). Third, positive reinforcement is delivered differentially for desired behaviours only and any inappropriate behaviours are ignored (Slater & Dymond).

Fox and colleagues (2012) used differential reinforcement of other behaviour (DRO) to reduce inappropriate behaviours in horses tethered in cross ties. Cross ties are a common method for securing horses in the United States when the horse is standing in a barn aisle. Two ropes attached to each side of the barn are attached either side of the horse's halter. Horses may become restless while standing and the horses used in this study had developed biting and chewing behaviours (Fox et al.). The DRO schedule was chosen as maintaining reinforcers for the biting and chewing could not be easily identified (Fox et al.). The treatment consisted of DRO schedules that were progressively thinned by increasing the DRO interval and reducing the rate of reinforcement (Fox et al.).

The researcher stood approximately 7 metres in front of the horse to record behaviour and a second person fed the horse. Fox (2012) noted that while behaviours were modified by the DRO schedule, the delivery and practicality of the treatment was questionable. One factor that might have affected the results included having the handler so close at hand. Unwanted behaviours may have increased because the horses were expecting to be handled or fed. To avoid the possibility that the researcher was an establishing operation for the behaviour, the behaviours could have been recorded by video camera. Adjunct behaviour may be another explanation for the chewing and pawing behaviours. Adjunct behaviours are likely as a result of the temporal delay in reinforcement (J. O. Cooper et al., 2007). If the horse was restricted but anticipating reinforcement these behaviours may simply be manifestations of frustration. Human examples include smoking, doodling and other time filling type behaviours (J. O. Cooper et al.). This study highlights the difficulties encountered when conducting applied research. In an experimental setting the recording of behaviour and delivery of reinforcement would be automated removing the need for human intervention (J. O. Cooper et al.).

The study demonstrated the difficulties in applying certain techniques in an applied setting. Two people were required to monitor and reinforce the horse. In the natural setting owners and trainers are busy and may not have the time to implement a DRO schedule effectively. The use of non-contingent reinforcement was suggested as a possible alternative. It would be easier for a single person to administer but response independent procedures still present implications in the applied setting. These include time restraints and the need for an unpredictable schedule of reinforcement. If positive reinforcement is to be applied with comparative ease, perhaps the type of intervention needs to be assessed as well as the rationale behind it.

The ABA Code of Ethics state that the client's needs are the priority and only socially valid behaviours are to be targeted (J. O. Cooper et al., 2007). In this example one must question the need to have a horse standing for a length of time in cross ties. There was no discussion as to why the horses needed to stand for 20 minutes or whether the horses were stabled or at grass outside the training sessions. This information is relevant when expecting a horse to stand for prolonged periods as antecedent events play a central role in establishing operations (J. O. Cooper et al.). Arranging establishing operations before training sessions might include adding exercise, feeding and social interaction before each session (J. O. Cooper et al.). Perhaps training the horse to stand using a procedure to increase duration would be a more appropriate way of reducing the unwanted behaviour (Slater & Dymond, 2011). The biting and chewing behaviour may reduce as a result of reinforcement for appropriate behaviour.

Unlike other studies using differential positive reinforcement, Fox and colleagues did not see any improvement in pawing behaviour, a third untargeted behaviour, during the DRO intervention (Ferguson & Rosales-Ruiz, 2001; Fox et al., 2012; Slater & Dymond, 2011). From a welfare perspective, targeting certain behaviours and not others without investigating the

reason for the behaviours may lead to unnecessary training, and the masking of welfare concerns (Brando, 2012). The use of a DRO schedule in this example appears to be time consuming and labour intensive. It required constant supervision during the training, making it less effective and less efficient for equestrians to administer easily. Despite these limitations the study does demonstrate the successful application of positive reinforcement to reduce a challenging behaviour under certain conditions (Fox et al.).

Float Loading Research

Studies that investigate float loading issues have covered numerous welfare concerns. They include basic training procedures used, the direction of travel, time and distance travelled, plus heart rate and general conditions of the horses during transit (Ferguson & Rosales-Ruiz, 2001; Munsters, van den Broek, van Weeren, & Sloet van Oldruitenborgh-Oosterbaan, 2013; Shanahan, 2003; Weeks et al., 2012). Loading horses is a potentially dangerous procedure that occurs frequently and many of these issues can't be addressed adequately by the owner (Waran, Leadon, & Friend, 2007). The most suitable float to use may be too expensive for some owners, and the journey length and time spent in the float may be uncontrollable (Waran et al.). Appropriate training however can be undertaken and there is evidence to support the application of positive reinforcement and target training when teaching horses to load (Ferguson & Rosales-Ruiz; Slater & Dymond, 2011).

Two studies show the application of positive reinforcement used in conjunction with target training and a secondary reinforcer, to increase appropriate behaviour and reduce inappropriate behaviour during loading (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). Inappropriate behaviours reduced significantly in both studies with no direct intervention and all horses were taught to load successfully (Ferguson & Rosales-Ruiz; Slater & Dymond). Slater

and Dymond replicated the procedure used by Ferguson and Rosales-Ruiz conditioning four horses to a secondary reinforcer by pairing the sound of the clicker with the presentation of food and training them to touch a target before float loading training began. A task analysis was carried out to determine the number of loading steps, and behaviours were defined and measured during baseline. Although Hendriksen's study also selected horses based on their poor loading, they didn't appear to collect baseline behavioural data. Slater and Dymond selected horses based on the criteria that they wouldn't load on to the float during baseline and used a multiple baseline, within-subject design.

Using the target during the initial loading responses enabled stimulus control to be established however it is unclear if the target was faded out or not (Ferguson & Rosales-Ruiz, 2001, p. 421). The findings of both studies provided evidence to support their hypotheses - that loading behaviours could be shaped by the use of target training and differential positive reinforcement (Ferguson & Rosales-Ruiz; Slater & Dymond, 2011).

Owners were not directly involved in the training but loaded the horse for the maintenance and generalization probes. Training appeared to generalize to both the owner and a novel float (Slater & Dymond, 2011). It wasn't clear how the owners were instructed to load the horses or whether they received any training, but they did complete a questionnaire as to whether they would continue to use or recommend the method. Social validity measures included the survey and an interview with each owner, however monitoring actual owner behaviour may have provided more information about the likely ongoing success of the intervention. Questionnaires provide valuable information on participants' thoughts about a procedure and indicate their likely behaviour in the future, but are not accurate indicators of actual behaviour (Reid & Parsons,

1995). It may have been useful to conduct a follow up probe to determine whether owners were still using the technique correctly.

Both studies noted that owners commented on their horses' general improved behaviour (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). For example, horses were easier to catch and handle outside of the training sessions. This supports earlier findings that positive reinforcement may encourage exploratory behaviours and may calm horses with previous negative loading experiences (Baragli et al., 2011; Hendriksen et al., 2011; Innes & McBride, 2008). These results also support the use of a secondary reinforcer in conjunction with positive reinforcement. Using a secondary reinforcer to reinforcing trial and error type behaviours in novel or fearful situations is easier using a secondary reinforcer as each step or approach behaviour can be identified (Slater & Dymond).

Dominance and control appear to underpin traditional training systems, whereas co-operative training systems appear to be more similar to the behaviour of horses in the wild (Goodwin, 1999). Ethology plays an important part in understanding species specific behaviours such as the flight response in horses; however behavioural science may be of more direct use to owners during float training (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). Despite evidence to the contrary, horse training has remained comparatively unchanged (van Weeren, 2008). This reluctance to incorporate current evidence-based training suggests that rider/trainer knowledge may play an important role in disseminating any research findings (van Weeren; Warren-Smith & McGreevy, 2008). But how do we bridge the gap between what is known about behaviour and learning processes in academia, and what is observed in the field of traditional horse training?

Trainer Knowledge and Training Management Concerns

Unlike many animal trainers, equestrians in general have not embraced the use of positive reinforcement (Dougherty & Lewis, 1991; J. L. Williams et al., 2004). Researchers have noted that equestrians often lack accurate knowledge of learning theory and the principles behind the techniques used in traditional training (Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy, 2008). Equestrian language can cause confusion amongst trainers and anthropomorphic language used to describe behaviours can lead to assumptions about horses' intelligence and capabilities (McGreevy & McLean, 2007). Many equestrian terms are difficult to define such as the following; soft, on the bit, and engaged – terms all used to describe how the horse holds the bit in its mouth and how it moves when ridden (McGreevy, 2007). The use of a systematic science based procedure may assist trainers and owners to avoid some of the confusion caused by these terms and allow even a novice owner to train a horse more easily (McGreevy).

What is needed is a way to disseminate knowledge and skills to people that is easily taught and applied. Many current equestrian practices inhibit the dissemination of science-based knowledge and learning. It is common practice for example to send your horse away to be trained or to have a professional trainer work with your horse when problem behaviours persist. If the horse is sent away to be trained the owner may not be informed about the techniques or systems used. Even if they are informed of the procedures, they may be unable to replicate them. Alternatively owners may choose to rely on peers for information on training methods, or seek advice from veterinarian and farriers who are perceived as knowledgeable (Visser & Van Wijk-Jansen, 2012). Relying on peers for information may lead to misinformation or poor translation of techniques, and veterinarians and farriers are not necessarily well informed on training

practices (Brando, 2012; Visser & Van Wijk-Jansen). Technology and social media may help to disseminate training methods but marketing and advertising of current trends in training may not include information about evidence-based training. Training the owners how to apply behaviour-analytic techniques correctly has the added advantage of disseminating information as well as enabling the owner to learn a skill that can be generalized to other training situations (Najdowski et al., 2010).

Training People – Issues and Procedures

Training people to use new behavioural techniques or to change existing behaviours is fairly common practice within the health care industry (Campbell, 2007; Najdowski et al., 2010; Parsons et al., 2012). Training paraprofessionals and care givers to use behavioural techniques to reduce unwanted or dangerous behaviours is increasing within educational and home environments (Najdowski et al.; Parsons et al.; Reid & Parsons, 2002). Staff training research may consider both verbal skills and performance skills when planning a programme (Parsons et al.). For example there is a difference between being able to verbalise or write about a skill, versus being able to perform the skill (Parsons et al.). Visser and Wijk-Jansen (2012) noted this important difference when conducting their questionnaire research on how owners access information. Conceptual and procedural knowledge were considered separate skills, but part of a continuum (Visser & Van Wijk-Jansen). They noted that although owners might know that weaving (a stereotypic behaviour associated with stabled horses) is a welfare concern, they may not have the necessary procedural knowledge to turn the horse out into a paddock (Visser & Van Wijk-Jansen, p. 296).

It seems to be a logical approach to employ evidence-based practice when implementing both the training programme for staff and the intervention for the client (Parsons et al., 2012). Many

training programmes are not assessed for effectiveness or efficiency and are implemented by agencies based on what needs to be trained rather than on staff needs (Severtson & Carr, 2012). As Parsons and colleagues note staff don't always acquire or retain the skills supposedly taught during training. Considering which procedures to implement in a training programme frequently depends on training costs and staff availability, therefore cost effective training that maximizes staff time away from work may facilitate training (Reid & Parsons, 2002). The ongoing success of workplace training however, may depend on several other factors; the academic level of trainees, their beliefs and values about the training, the management support available, and the clients' behaviour (Campbell, 2007). Any one of these factors may prevent the successful ongoing application of the learnt skill and the results of any intervention (Campbell). Changing staff behaviour for the long term requires more than a workshop or lecture style approach to training (Parsons et al.). With regards to retaining knowledge, lecture formats and workshops have a relatively poor impact on staff behavioral change in comparison to role-play and onsite training with feedback (Adams, Tallon, & Rimell, 1980; Najdowski et al., 2010; Parsons et al.; Reid & Green, 2005). Training people individually may present even more challenges. First they may not perceive the need for change and second there is the lack of supportive management systems in place to foster ongoing training (Parsons et al.). Making the training relevant and able to fulfill individual needs, may help create motivation to learn according to Keller (1987). Keller describes four key components that form the ARCS model;

- Attention, capturing the interest of learners, stimulating the curiosity to learn
- Relevance, meeting the personal needs/goals of the learner to effect a positive attitude
- Confidence, helping the learners believe/feel that they will succeed and control their success

- Satisfaction, reinforcing accomplishment with rewards (internal and external)

These four components aim to target motivation, creating a person-centred approach to training.

Individual training within the equestrian industry may be through experienced coaches or instructors, at clinics or riding centres (Birke, 2007; Visser & Van Wijk-Jansen, 2012). However as Birke notes others may seek advice or training 'outside of the system' in an attempt to better understand their horses (p. 219). As stated earlier natural horsemanship has offered owners an alternative perspective of training, but effective dissemination and application of accurate information may still be a problem (Birke). Alternative training options may be met with reservations and mistrust especially when presented by non-equestrians (van Weeren, 2008). The equestrian industry is considered a closed field with a cultural as well as traditional bias towards certain techniques, therefore it is important to remove any potential barriers between the trainer and the owner (Birke; Farmer-Dougan & Dougan, 1999; van Weeren). Keller's ARCS model may provide a useful approach by making connections between the owner's existing knowledge and new relevant information (Birke; Keller, 1987; Parsons et al., 2012). Applied Behaviour Analysis methodology may provide a science-based framework for understanding the needs of the owner and for considering the welfare of the horse (J. O. Cooper et al., 2007).

Applied Behaviour Analysts as Trainers

Applied behaviour analysts may have similar concerns about meeting the needs of the caregiver or teacher, and the welfare of their client. Their obligation is to undertake an intervention to decrease or increase socially important behaviours (J. O. Cooper et al., 2007). Fostering 'by in' from caregivers or support staff may play a crucial role in the initial and ongoing success of any intervention (J. O. Cooper et al.). Gaining the support of horse owners in order to address welfare and training concerns may involve considering what training systems

currently appeal to them (Birke, 2007). This may be challenging as cultural influences and acceptance of 'folklore' in the equine industry appear to be in direct opposition to ABA principles (Farmer-Dougan & Dougan, 1999). Farmer-Dougan and Dougan suggest that behaviour analysts may impact on public behaviour change by "drawing parallels between folk wisdom and behaviour analysis" (p. 148). This acknowledgment of mainstream thinking within academic circles may enable evidence-based practice to become accepted and integrated within the equine industry (Farmer-Dougan & Dougan; McCall, 2007).

Behaviour analysts' skills are based on training clients not staff, however these same skills can be applied to staff training programmes (Parsons et al., 2012, p. 3). Parsons et al identified a behavioural skills training (BST) protocol that includes the following steps;

1. describe the target skill
2. provide a succinct, written description of the skill
3. demonstrate the target skill
4. require trainee practice the target skill
5. provide feedback during practice
6. repeat steps 4 and 5 to mastery

BST may provide a framework for conducting training that is sustainable and easily incorporated into other fields (Graudins, Rehfeldt, DeMattei, Baker, & Scaglia, 2012). BST procedures consist of instruction, modeling, role rehearsal and feedback (Graudins et al., p. 980). Parents, teachers and medical staff have been trained to use behaviour analytic techniques effectively in applied settings using various BST procedures (Graudins et al.; Najdowski et al., 2010; Parsons et al., 2012). There appear to be no behavioural studies that have trained horse owners to use positive reinforcement.

Butler, Sargisson and Elliffe (2011) noted that previous studies had achieved some success training dog owners to reduce unwanted behaviours. The owners were given instructions via the phone and in writing but there was no monitoring of delivery and no observations of baseline and follow up behaviour. Butler and colleagues suggested the wide range of instructions and lack of monitoring make it difficult to determine both the owners' compliance with instructions and the efficacy of any one treatment (p. 137). Rather than overload participants with too much information, providing an individual training programme allows information, training and feedback to be monitored and evaluated progressively (Reid & Green, 2005).

How to Train People

Assessing current staff knowledge and needs before training may enable the trainer to communicate with staff more effectively (Campbell, 2007). Using the ARCS model may help to provide a relevant and efficient training programme by considering the staff's perspective on training (Keller, 1987). A combination of ARCS and BST may increase the success rate of an individual training programme. The methods used may entail any combination or single use of lectures and workshops, written instructions and verbal instructions, role play, and feedback. The effectiveness and efficiency of these methods may depend on a number of variables such as training time, combination of methods employed, educational level of learner, tutor knowledge and numbers of learners under instruction (Reid & Green, 2005). Research has indicated that workshops and instruction manuals alone may not result in lasting staff behavioural change (Adams et al., 1980; Parsons et al., 2012; Reid & Parsons, 2002) . Severtson and colleagues trained novice practitioners to use Discrete Trial Teaching (DTT) with autistic children and used a sequential analysis procedure to identify what teaching methods worked best (2012). The three teaching models used were self-instruction using a manual, video instruction and modeling, and

performance feedback (Severtson & Carr). Their results show that although the manual alone was sufficient for half the participants to master DDT, the remaining participants required all three methods to achieve mastery (Severtson & Carr). This provides further support for an individualized training programme that can be monitored and evaluated according to individual results.

Generalization

Maintenance and generalization of responses or stimuli are considered good measures of a successful intervention (J. O. Cooper et al., 2007). An ABC design demonstrates maintenance and generalization, providing evidence that training is maintained over a period of time after the intervention (J. O. Cooper et al.). According to Stokes and Baer (1977, p. 350) there are several ways to plan for generalization that include the following;

- Train and hope
- Sequential modification
- Introduce to natural maintaining contingencies
- Train sufficient exemplars
- Train loosely
- Use indiscriminable contingencies
- Program common stimuli

Gianoumi and Sturmey evaluated the use of generalization strategies in studies that operationalized their procedures, took data on individual's behaviour and used a single subject design (2012, p. 619). They found that the most common strategies were; programme common stimuli, train sufficient exemplars and mediated generalization (Gianoumis & Sturmey; Stokes &

Baer). Their evaluation states that the studies provided empirical support for training to generalize under these three procedures (Gianoumis & Sturmey).

Horse training depends on horses generalizing certain responses and some stimuli, but also requires stimulus control for other behaviours. Trainers do not want horses to generalize leg aids for example, as each aid denotes a specific response (McGreevy & McLean, 2007). For float loading generalization of certain stimuli and responses is preferable so that horses will load into any float, with any person. Previous studies have demonstrated generalization across trainers and vehicles but not to distractions such as other horses or people being present (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). In the natural setting horses are loaded at different locations and under different conditions with other horses, people and distractions around them. Training horses to generalize to these distractions as well as trainers and vehicles may be an important part of a successful intervention. An applied setting provides opportunities to embed generalization into the intervention. Minimizing the changes to the environment before training, changing trainers, varying reinforcers, giving loose instructions or cues, and varying surrounding stimuli all support generalization (Stokes & Baer, 1977). For example conducting the training within the natural environment means that distractions form part of the training routine. Slater and Dymond suggested future studies might include putting rugs and boots on the horses if these are worn as part of the floating procedure. Trainers might wear different clothing and training might occur at different times of day. Depending upon the existing behaviour of the horse it may be appropriate to start off with minimal distractions. Gradually exposing nervous horses to the banging of float doors for example before attempting to load them. For horses with previous bad experiences of loading, exposure to distractions such as other horses and people moving around the float may help the horse to habituate to them before training. Programming

common stimuli such as distractions during float training supports the likelihood of generalization to a busy show environment (Gianoumis & Sturmey; Stokes & Baer).

Proposed Study

The findings in previous research and the suggestions for future research have highlighted two key questions;

1. Can owners be taught to train their own horses to load on to a float using positive reinforcement and target training?
2. Can loading behaviours in horses be increased and unwanted behaviours reduced or eliminated by training the owner to differentially reinforce desired behaviours?

Hypothesis

This study seeks to replicate and extend Slater and Dymond's (2011) research. In previous studies the researchers trained the horses, concluding that positive reinforcement was an effective way to train trailer loading and suggesting that future research might consider training the owners (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond). The hypothesis is that owners can be trained to use target training and positive reinforcement with their own horses and that this result in an increase in loading behaviours and a reduction in unwanted behaviours (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). It is anticipated that training the owners will develop both procedural knowledge and conceptual knowledge (Visser & Van Wijk-Jansen, 2012).

The study will consider how to effectively train the owner to train their own horse to load, by addressing the following issues;

- Increase horse loading behaviours using positive reinforcement, target training plus a conditioned reinforcer (using differential reinforcement may help reduce unwanted behaviours).
- Up-skilling equestrians by training the owners and encouraging them to look outside of the horse industry/field for training solutions (Visser & Van Wijk-Jansen, 2012).
- Increase awareness of welfare and training concerns by explicitly explaining the procedure and outlining the benefits to both horse and owner
- Generalization will be embedded into the procedure and maintenance and generalization for both horses and owners will be addressed.

Rationale

The aim of this study is to expand knowledge within the equestrian community as well as draw attention to positive reinforcement as an effective ethical training tool, therefore the chosen format will be systematically to train the owners to use behaviour-analytic procedures. Target training and positive reinforcement with a secondary reinforcer were chosen for both ethical and sustainable reasons. The procedure does not entail using an aversive stimulus and allows a single person to safely and effectively load a horse without having to increase pressure if the horse did not respond (as they would have to do if using negative reinforcement). A key point of difference in this project is horses will be trained to go to the target independent of the owner. This will enable safe and effective loading reducing the likelihood of injury to horse or owner during the process. The training procedure selected was based on two factors. Loading has been successfully trained using differential reinforcement in previous studies, and loading is potentially a dangerous procedure for a single person.

Methodology

According to Parson and colleagues (2012) effectiveness, efficiency and acceptability are important training considerations so a BST approach will be applied combining the ARCS model (Keller, 1987; Parsons et al.).

Behaviour Skills Training

- A clearly defined skill/technique – target training using positive reinforcement
- Written instructions - task analysis of loading procedure
- Modeling/video modeling – watch video of trained horse and owner
- Practice – role rehearsal with researcher
- Feedback - during and after training via email or texts

ARCS

- Attention – advertising opportunity to be part of a study
- Relevance – solving a problem that is important to them
- Confidence – training the owners individually in their own environment
- Satisfaction – feedback, using technology to provide feedback and additional support

The above strategies may alleviate several potential difficulties associated with training the owners to use positive reinforcement. The initial concern is the horses are problem loaders so by definition will be displaying undesirable behaviours. The process involves training an inexperienced owner to train an inexperienced horse. Earlier training studies however, have shown using role rehearsal and feedback has enabled staff to be trained to teach clients in the natural setting (Graudins et al., 2012; Severtson & Carr, 2012). The owners' current knowledge, experience and willingness to learn may impede progress. The popular use of anthropomorphic

language to explain horses' behaviour may interfere with accepting a new training procedure that uses scientific principles to explain the behaviour (McGreevy, 2007). The lack of knowledge about general training principles within the equestrian community may also impact on owners' willingness to continue with training (van Weeren, 2008; Warren-Smith & McGreevy, 2008). Owners may feel separated from other equestrian groups because they are using a less conventional method (Birke, 2007). Finally traditional training systems prevail in many forms and guises within the industry. The successful implementation of so called 'new methods' may well rely on how similar they are to existing methods. For example the inclusion of food as part of a systematic training programme is not common with horses and therefore may raise suspicion as to its likely effect and outcome (Dougherty & Lewis, 1991).

The selection of owners will be based on two factors – their willingness to participate in training under certain conditions, and the current loading behaviour of the horse. The following points are noted as likely variables across owners and horses, despite owner willingness and horse suitability.

- The quality of the existing relationship between horse and owner
- The training ability and receptiveness of the owner to learn
- Lack of time on behalf of the owner
- Lack of social validity within the owner's immediate equestrian circle

The benefits of training the owner include the following;

- Improving the existing relationship between horse and owner
- Training in the home environment
- Up-skilling the owner

- Behaviour can be measured and recorded for the owner

The researcher believes that the process of float loading horses needs to be treated as a dangerous task that requires safe and ethical training procedures based on relevant behavioural principles. The loading process may also benefit from a global approach to training drawing on principles that may not be immediately obvious to equestrians, or frequently used with horses. This study will focus on training procedural knowledge so that participants will be able to use the skills in other situations, with other horses, under different conditions (Visser & Van Wijk-Jansen, 2012). The findings from previous training research suggest that training equestrians is best carried out in the natural environment, incorporating role rehearsal and feedback (Parsons et al., 2012; Severtson & Carr, 2012). The inclusion of modelling and video modelling will enable the owners to watch an experienced horse loading, and see how to perform specific techniques such as handling the clicker and target (Moore & Fisher, 2007).

Method

Ethics, Recruitment and Selection Criteria

The University of Auckland Animal Welfare Officer advised that ethics approval was unnecessary because the procedure is part of normal horse handling. There was no manipulation within the meaning of the Animal Welfare Act (Ministry of Primary Industries, 1999). The researcher used the assistance of a high profile rider who advertised the study via her social media page. Several people emailed their interest in the study and were sent additional material and the researcher contacted them individually if they wanted to proceed with the selection process (Appendix A, B and C). The selection process included a telephone call outlining the procedure and arranging a visit to conduct an initial assessment and baseline session if appropriate. This initial assessment allowed the researcher to eliminate unsuitable candidates without relying on the owner's assessment alone.

A total of 10 horses were considered suitable subjects. The horses were selected based on the following criteria

- The horse was not easy to load in a float by one person, or did not load consistently and didn't load according to the study criteria – walk onto float and stand for 10 seconds - during baseline.
- The horse was available for the training sessions
- The horse was not considered dangerous by the owner or researcher (following baseline assessment)
- The owner consented to the training procedure (Appendix A)

Exclusion criteria included the following

- Any reluctance by the owner to accept the terms of the training conditions – such as no use of negative reinforcement or coercive methods
- The owner was unable to commit to an extended training period of up to a month at least.
- Baseline observations did not confirm the difficult loading behaviour or the horse loaded successfully reaching loading criteria in baseline.

One participant with two horses withdrew from the study before training began due to an increase in work commitments.

Subjects

The final eight horses varied in breed, age, gender and use. The details of horses and owners are summarized in Table. 1. All horses and owners were given pseudonyms for the study.

Guppy is a 15.hh grey mare of undetermined breed. She was approximately16 years old at the time of the study and had some clicker training experience. She would load but would back off before she could be fastened in and this meant two people were needed to load her. She is ridden mainly in the summer.

Jake a 16. 2. hh thoroughbred gelding was 18 years old at the time of the study. He is an ex-event horse that had a trauma falling in a float with a previous owner over 10 years ago. Jake has extensive clicker training experience and is able to perform a number of tricks. He wouldn't lead into the float, often backing out rapidly.

Marley is a miniature donkey gelding approximately 8 months old at the time of the study. He had no clicker experience. He would load but wouldn't stay on the float. Sappy is a miniature donkey gelding, 1 year old at the time of the study with no clicker experience. He wouldn't lead

towards the float or load without force. Both Marley and Sappy are taken to visit rest home residents.

Tina is a16 hh Hanoverian mare that was 5 years old at the time of the study and was the only horse ridden during the study. She was inconsistent with loading and frequently required driving on to the float with a whip. Tina had become wedged under the back bar in a loading accident some time ago.

Joe is a 16.hh warm blood gelding that is unridden. He was 3 years old at the time of the study and had never been taught to load and had no clicker experience. He is classed as a green horse just undergoing training

Peanuts is a 14.2.hh paint mare that was 12 years old at the time of the study. She had previously rushed back off a float and pushed under the back straps. She had no clicker experience. She is ridden at home by her 10 year old owner as she can't be loaded and taken to Pony Club.

Dee is a 15.3 hh Duvautelle mare that was 5 years old at the time of the study. Prior to commencing the study, she was re trained by someone at another property. She was injured in the process and her behaviours that included rushing off backwards and head throwing were deemed too dangerous by the owner and researcher. She was excluded from the study.

All of the horses lived out at grass with other horses on their owners' properties. Horses' feed and grazing was not restricted. Only Tina and Joe were fed hard feed and they were fed after training sessions.

Participants

Five owners and seven horses were selected for the study. Two participants were a mother and daughter working with Peanut and were collectively referred to as Participant 2. The other participants owned more than one horse. Jake was owned by the researcher but for the purpose of the study he was trained by Participant 1 who owned Guppy. Marley and Sappy were owned by Participant 3. Tina, Joe and Dee were owned by Participant 4

Participant 1 was already experienced in the use of the clicker with her other horse and had used it with her parrots and dogs. She was the only participant who currently used food to load her horse.

Participant 2 and Participant 3 had heard of the clicker but were unfamiliar with its use.

Participant 4 told the researcher she had used the clicker with her horses to train tricks and do some initial loading training.

All participants were experienced with horses, in the sense they had owned horses for some years. Two of the participants described themselves as novices in terms of training. One participant would be described as a professional trainer/equestrian, and was also involved in the competitive field.

Table 1. Participants' and Subjects' Characteristics - C Experience refers to Clicker Experience

Participant #	**C Experience**	**Horse**	**Age/Years**	**Gender**	**C Experience**
1 Janine	Yes	Jake	18	Gelding	Yes
		Guppy	16	Mare	Yes
2 Shaylee (10 years)	No	Peanut	12	Mare	No
Mary (mother)					
3 Lynn	No	Marley	18 months	Gelding	No
		Sappy	1	Gelding	No
4 Julie	Yes	Tina	5	Mare	No
		Joe	3	Gelding	No

Researcher

The researcher is a qualified primary teacher and was completing a Masters thesis as part of a 3 year course in Applied Behaviour Analysis. The supervisor is Professor Douglas Elliffe who has about 30 years' experience of behavioural research with animals.

Setting and Materials

Each horse was trained on their home property using the owner's float. The floats varied in size and design requiring individual steps for each float loading procedure. One float was an American style float requiring horses to step up into the float. One of the floats was a single axle single float and another was an angle loader requiring the horse to stand at approximately 45 degrees to the direction of movement. The donkey float was an adapted single axle box trailer with no windows. All the other floats had windows. The training sessions took place in convenient locations for the owners on their properties. A commercial clicker with a wristband was used throughout training and the target was a commercial marine float mounted on the end

of commercial broomstick that had been cut to size and varnished (Appendix D). Food varied between horses but all owners were advised to select food that was highly preferred by their horses. Some of the horses had changes in reinforcers within and across sessions. Changes in food were not recorded. This variation in feeds allowed for generalization as owners would generally feed whatever they had available. Owners used their own bumbag or a side bucket supplied by the researcher to carry food supplies, and received training in how to hold the clicker and target in the same hand. A small hand held video device was used by the researcher to record sessions and notes on behaviours were taken in a standard student notebook.

Generalization and Maintenance

Researcher and owners wore a variety of clothing across the training, this included coats and other rain wear. Horses were loaded in a variety of halters that they were familiar with, and Tina and Joe frequently wore rugs during loading. Floats were moved between training sessions for all horses except Jake and Guppy and horses were loaded from different distances. Jake and Guppy had a generalization session at the end of their training. There were various distractions that occurred at the home environment such as people walking past, and other horses or animals approaching the area. As stated above, food was varied for all horses during the study to allow for transition to the natural environment when owners may use whatever food they have available. Owners provided video evidence of maintenance trials conducted up to nine months after training.

Inter-observer Agreement

An independent observer collected data from video recordings for all baseline sessions and 40% of training videos for each horse. The observer was an experienced field researcher from the Department of Ecology and Evolutionary Biology at the University of Colorado. Agreement was calculated by dividing the amount of agreements by the amount of agreements plus disagreements and multiplying by 100.

Design

A within-subjects ABC research design was used to assess the effect of target training and positive reinforcement on problem loaders. Three baseline sessions were conducted with each horse to record and define existing problem behaviours under current loading conditions. Each baseline session consisted of one trial and the owner was instructed to load their horse as normal. The training was broken into three phases. Maintenance trials were carried out by owners up to 9 months after training.

Dependent variables and measurements. The inappropriate behaviours are listed in Table 2 and were defined following observations during baseline.

Table 2. Inappropriate Behaviours

Behaviours	**Definitions**
Head toss	Head turns 90 degrees to either side or is raised with nose above the vertical
Standing	Horse stops walking and won't resume when prompted by owner
Turning	Any foot movement to the side unprompted by owner
Backing	Horse moves at least one foot backwards unprompted by owner

A target trained horse was videoed loading independently of the owner to determine the approximate number of steps required to load a horse. This video recording also acted as a teaching aid with the owners in the first session.

The number of loading steps for each individual float used in the study was determined during baseline observations. Table 3 shows the steps for the individual floats.

Table 3. Float Loading Steps for Individual Floats

Step	Description of steps for angle float
1	Approach base of ramp
2	One foot on ramp
3	Two feet on ramp
4	Three feet on ramp
5	Four feet on ramp
6	One foot in float
7	Two feet in float
8	Three feet in float
9	Four feet in float
10	Moves over
11	Stands for 10 seconds

Step	Description of steps for the step up float
1	Approach float door
2	One foot in float
3	Two feet in float
4	Three feet in float
5	Four feet in float
6	Stands for 10 seconds

Step	Description of steps for single float
1	Approach base of ramp
2	One foot on ramp
3	Two feet on ramp
4	Three feet on ramp
5	Four feet on ramp
6	One foot in float
7	Two feet in float
8	Three feet in float
9	Four feet in float
10	Stands for 10 seconds

Data collection was carried out by the researcher who videoed all baseline and training sessions and took pencil notes while coaching. Conditioning and target training were not recorded. The maximum loading step completed each session, and the number of inappropriate behaviours displayed during baseline and training were recorded. The time taken to load or attempt to load from 10 meters away from the float was recorded at baseline and for the three terminal trials only. The total number of sessions to reach loading criteria were also recorded. The approach distance was measured for baseline, initial training and terminal training sessions, but was also varied during training to allow for generalization and that fact that horses are not always loaded within a certain distance of a float.

Procedure

Baseline. Three baseline sessions were conducted, each consisting of one trial. All unwanted behaviours were recorded and the session was videoed for reviewing later and for inter-observer agreement analysis. Each owner attempted to load their horse using their current method starting 10 metres from the ramp. They were requested not to use whips or other aversive methods but otherwise to proceed as normal. The session ended if the horse was loaded successfully according to the study criteria, or one minute had elapsed.

Pre-training. The owners received written instructions before training via email, verbal instructions on the day, followed by role play with feedback. The details of the pre-training are given in the appendix (Appendix D). The researcher pretended to be the horse and the owner practiced holding the target, using the clicker and feeding. Training then began with their own horse. During actual sessions the researcher gave *in vivo* instructions such as 'click now' or say 'target', and verbal praise for correct performance.

Classical conditioning. The two conditioning sessions took place over two days. The clicker was paired with the presentation of food. Full details are given in the appendix (Appendix G). The horse was tied up to a suitable station using a quick release knot. The owner stood by the horse's shoulder and clicked and immediately after the click they fed the horse. Each session consisted of 30 trials, 15 trials standing on each side of the horse (Karrasch et al., 2000). Success criteria was set at the horse pricking their ears at the sound of the click and the horse not mugging the owner for the food (Karrasch et al.). If the horse displayed any unwanted behaviours such as pushing the owner or biting, the owner was instructed to stand back and ignore the behaviour. They counted to 10 before recommencing a new trial. Otherwise, inter

trial intervals were based on the length of time it took the horse to eat or for the owner to change sides.

Target training. Target training commenced at least two hours after pairing. Success criteria was set at three correct responses at each level. The target training steps are outlined in Table 4. A maximum of 18 trials per session were conducted twice a day with at least one day in between training days.

Table 4. Target Training Steps

Step	**Description**
1	Present target for 10 seconds immediately under the horse's nose saying target
2	When horse touches click and feed and remove target by holding behind your back.
3	Repeat for 3 touches within 10 seconds
4	Ask for target touches within 5 seconds
6	Repeat for 3 touches within 5 seconds
7	Ask for target touches at 30 cm within 10 seconds
8	Repeat for 3 touches within 10 seconds
9	Repeat for 3 touches within 5 seconds
10	Ask for target touches at 60 cm or more so horse has to move one step within 10 seconds
11	Repeat for 3 touches with horse moving within 10 seconds
12	Repeat for 3 touches with horse responding within 5 seconds

If the horse didn't respond within the time limit the trainer went back to the last successful step.

Target training was terminated when horse followed the target for 90% of trials across two consecutive sessions.

Float training. Float training began at least two hours after reaching target training criteria (Slater & Dymond, 2011). Based on baseline observations, the average step reached successfully in baseline was deemed as the starting point for the first session. Success criteria was set at three consecutive successful loads across two consecutive sessions. The training was broken into three phases for all horses outlined in Table 5 and 6. The number of sessions and days training will be reported in the results as it was varied according to each horse's behaviour rather than predetermined.

Table 5. Training Phases for All Horses except Peanuts

Phase	**Description**
one	Using handheld target
two	Fading out owner from float
three	Fading in centre bar and hold on target

Table 6. Training Phases for Peanuts

Phase	**Description**
one	Using handheld target
two	Using target on pole in float + hold
three	Fading out person in float

Phase one - The owner used the handheld target to lead the horse to the maximum step achieved in baseline, clicked and fed the reward. After three successful trials, the horse was lead to the next step with the target. The maximum number of trials was set at 12. If the horse was

unsuccessful for two consecutive trials they were taken back a step. The horse would be taken back to target training if they failed twice at the previous step. Once the horse loaded with all four feet in float, the owner asked the horse to touch a stationary target inside the float and faded out the handheld target.

Phase two – the owner stood further away from the stationary target beginning by standing half way in the float and pointing at the stationary target and leaning towards it giving the verbal cue target. The owner then stood in the doorway and finally stood outside the float or on the ramp depending on the float design.

Phase three – the centre bar was added to the float or the bar was moved towards the horse. The hold on the target was also introduced (Appendix G).

Phase two and three differed for Peanuts as the owner could not lead her into the single float. A target was attached to a pole held by a person at the front of the float. The owner led Peanuts up to the float entrance, before removing the handheld target from sight. She pointed at the target on the pole and said target. Maintenance sessions were carried out by owners at their earliest convenience up to nine months after training ended.

Social Validity

A confidential questionnaire was emailed to participants asking them about their training philosophy and what actions they had undertaken during and after the training (Appendix I).

Limitations

Potential limitations within the study varied across horses as some were being ridden or handled regularly while others remained in the paddock in between sessions. The following were identified as having a potential impact on the data.

- Horse being ridden during the study
- Horse being taken to events during the study – the researcher wrongly assumed that since the horses were problem loaders they would not be able to be loaded
- Living arrangements - some horse were being stabled or yarded for long periods.
- Feeding time before and after training – although the researcher did ask that feed be restricted immediately before to training.
- Treatment of horse before and after training – negative reinforcement being used to lead horses
- Owner's response to horse's behaviour before and after training
- Procedural integrity was not measured

Several planned limiting factors were considered acceptable.

- Training to take place in the home environment only
- Training using only one float
- Training and data collection by researcher only
- Latency was not recorded for training
- No baseline of owners' behaviour was taken
- Owner behaviour during and after training was not directly measured

Results

Baseline and Loading Steps

Figures 1 to 7 show the maximum loading step achieved during baseline and training sessions for each horse. Solid lines indicate changes in training phase for all horses. Figures 8 and 14 show the number of inappropriate behaviours during baseline and training sessions. Baseline was one trial only compared to training sessions with up to 12 trials, so the number of behaviours is divided by the number of trials per training session. Baseline data were taken for three trials only for all horses. It was impractical to continue baseline sessions until stable responding for most owners. Solid lines indicate changes in training phase for all horses. These changes include the fading out of the handheld target, the owner and the addition of the 'hold on target' and the back or centre bar. Dotted lines indicate small changes within phases such as the distance the centre bar was moved.

Tina was the only horse to fail terminal criteria. All horses reached initial training criteria. Guppy and Marley demonstrated the fewest resistant behaviours and needed to increase duration once they were on the float. Jake, Peanuts, Tina and Sappy displayed the most resistance behaviours and needed to increase initial loading behaviours such as walking onto the ramp.

Joe. Figure 1 shows the maximum loading steps for Joe. Joe was the only naive horse with no float loading experience. The maximum baseline step was Step 3 and after initial target training he went straight to Step 5 with all four feet in the float. By Session 7 he dropped back to Step 3. It was a step up float and as Joe backed off during Sessions 4 to 6 he occasionally slipped as he backed out. The owner was advised to guide him off the float with her hand on his shoulder and reinforce him for backing off one foot at a time. He immediately went to Step 4 and reached Step 5 by Session 10. The continued training at Phase A consolidated this backing

off and he progressed rapidly in Phase B as the owner was faded out. Phase C Session 20 included introducing moving the centre bar and holding on the target. Joe reached terminal criteria by Session 25.

Marley. Figure 2 shows the maximum loading steps for Marley. Marley loaded but would not remain in the float for 10 seconds. Stable baseline data show that he reached Step 10 across all three baseline trials. After initial target training Step 10 was maintained through Phases A and B. The 'hold on target' was introduced in Phase C. The owner increased the hold too quickly in Session 8, but Marley held for 10 seconds. The hold was reduced and gradually increased across Phase C. He reached terminal criteria by Session 14. A probe session was conducted a week later. Inappropriate behaviours across baseline and training are shown in Figure 9. Marley's main inappropriate behaviours were turning round in the float and standing. These behaviours reduced to zero after training through Phases A and B. Head toss started and decreased in Phase C across Sessions 7 and 8. Standing and turning occurred at minimal levels in Session 7 and 10 respectively.

Sappy. Figure 3 shows the maximum loading steps for Sappy. The maximum baseline step for Sappy was Step 3 and the trend suggests that loading steps were increasing. Figure 10 shows Sappy exhibited all four unwanted behaviours at baseline. Standing was the main problem behaviour peaking at five stands in one baseline trial. Standing and backing dropped to zero in the first session following initial target training, and turning and head toss reduced to minimal levels. Loading steps increased to Step 5 - four feet on the ramp and then increased in one session to Step 9 with four feet in the float. He reached loading criteria at Session 15 and terminal criteria at Session 16

Guppy. Figure 4 shows the maximum loading steps for Guppy. Stable baseline data show she was loading at Step 10 however she would back out immediately before the back bar could be fastened. Following target training she continued to load at Step 10 and progressed quickly through the training phases with no decline in loading steps across Phase A and B. At Phase C when the centre bar was moved and the hold introduced she reached performance criteria in one trial and reached terminal criteria in two sessions. Inappropriate behaviours across baseline and training are shown in Figure 11. Backing behaviour prevented Guppy from reaching loading criteria according to her owner and this is verified in baseline data. The baseline data show a decline in standing and head tossing, but an increase in backing behaviour even though she had all four feet in the float. All behaviours reduced to zero across Phase A and B following target training. In Phase C when the hold and back bar were introduced Guppy was holding for 10 seconds by Session 8 but backed as the bar was moved. She reached terminal criteria by Session 11.

Jake. Figure 5 shows the maximum loading steps for Jake. Stable responding was not achieved at baseline and data show an increase in maximum loading steps achieved across baseline trials. Phase A began in Session 4 and Phase B started at the end of Session 4 as Jake was already experienced with the target and progressed rapidly without the hand held target. Step 10 was maintained across Phases A/B and C. Jake reached Step 11 by Session 8 in Phase C when the 'move over' cue and back bar were added. The bar was moved in approximately 50mm increments. Jake reached terminal criteria by Session 13 when the float had been moved and the back bar could be fastened. Inappropriate behaviours across baseline and training are shown in Figure 12. Jake displayed all four unwanted behaviours in baseline, but the main behaviour that prevented successful loading was backing. All these behaviours reduced to zero

in Session 4 but backing and head tossing started again in Session 5 when the owner was faded out towards the door. Head tossing reduced to zero, and backing reduced, but standing started in Session 6. All behaviours ceased again in Phase C Session 7 as the centre bar was moved towards Jake. After commencing in Session 8, backing continued to decrease across Session 9 and 10. By Session 11 all behaviours had ceased although backing surfaced again in Session 12. The change in location of the float marked an increase in three of the baseline behaviours in Session 13. Jake showed minimal backing in the final session. Despite the return of some inappropriate behaviours, the data show Jake was loading and standing for 10 seconds for the bar to be fastened.

Peanuts. Figure 6 shows the maximum loading steps for Peanuts. Baseline data show Peanut's maximum step was Step 3 with two feet on the ramp. She didn't progress any further after initial training so was returned to target training. There were some technical problems during these first few sessions. Peanuts handler Shaylee was only 10 years old and she found it hard handling the hand held target and clicker and leading the horse. The researcher assisted Shaylee and led Peanuts up to the start marker for Sessions 8, 9 and 10. Peanuts was slow to respond to the target during the first few sessions so target touching practice was carried out prior to or during training Sessions 4 to 7. Peanuts reached loading criteria at Phase C – with the introduction of the 'hold on target' and moving the back chain. She reached terminal criteria at Session 17 when the person inside the float was faded out. Inappropriate behaviours across baseline and training are shown in Figure 13. Peanuts' main inappropriate behaviours that prevented successful loading were standing and backing. Following initial target training, backing and head toss dropped to zero, and standing reduced to minimal levels. Standing continued to decrease reaching zero at Session 8 Phase B. Standing resumed at Session 9 and

across Phase C when the hold on target and moving back chain was introduced. All behaviours ceased at Session 15, Phase C and only backing surfaced in the final session as the person in the float was faded out. Peanuts reached terminal criteria but immediately following this she backed out under the back chain.

Tina. Figure 7 shows the maximum loading steps for Tina. The maximum baseline step achieved was Step 3. Following initial target training she progressed through Steps 4 to 5 within two sessions. Prior to Session 15 she was loaded for an event and went back to baseline levels. The data show she reached loading criteria by Session 25 - standing for 10 seconds. Inappropriate behaviours are shown in Figure 14. Tina was the only horse not to reach terminal criteria – loading and standing for 10 seconds for three consecutive trials across two sessions. Tina was entered for several show events and was loaded during the training. She was withdrawn from the study by mutual agreement.

Time to Load

Figures 15 to 21 show time taken to load before and after training. Prior to training none of the horses loaded within 1 minute and stood for 10 seconds. After training all horses loaded within 15 seconds or less and stood for 10 seconds for at least three consecutive trials. Tina was the only horse not to reach terminal criteria. Her final loading time was taken from the first loading criteria reached before she was withdrawn from the study. A loading distance of 10 metres was measured from the start to the float entrance for both baseline and terminal loading times.

Number of Training Sessions

Figure 22 shows the number of float loading training sessions to reach loading criteria. Sessions lasted approximately 15 minutes. All horses that reached loading criteria were loading into the float within 15 seconds or less. The final sessions were timed from a 10 metre distance, as in baseline, until all four feet were in the float. Both Marley and Guppy loaded all four feet during baseline however they did not remain in the float for 10 seconds after loading. Although the final criteria included standing for 10 seconds this time was not included in the time-to-load measure. Baseline sessions and preliminary conditioning and target training sessions were not included in the session count.

Guppy reached terminal criteria within 8 float loading sessions. Target training and training were spread over a total of eight days with two or more sessions per day.

Jake reached terminal criteria within 11 float loading sessions. Target training and training were spread over a total of eight days with two or more sessions per day.

Peanuts reached terminal criteria in 14 float loading sessions. Target training and training were spread over a total of 10 days with between one to three sessions per day

Marley reached terminal criteria in 11 float loading sessions. Target training and training were spread over 11 days with between one and two sessions per day. There was a five day gap between the 10^{th} and 11^{th} day.

Sappy reached terminal criteria in 13 float loading sessions. Target training and training were spread over 11 days with between one and two sessions per day. There was a five day gap between the 10^{th} and 11^{th} day.

Joe reached terminal criteria in 22 float loading sessions. Target training and training were spread over 22 days with between one and two sessions per day. There was an 11 day break between the 7th and 8th day.

Tina reached criteria in 23 sessions but did not continue training as she was loaded for showing which was impacting on her training. Target training and training were spread over 22 days with between one and two sessions per day. There was an 11 day break between the 7th and 8th day.

Table 7. Total Number of Float Training Sessions and Total Training Days

Horse	Float Training Sessions	Total Training Days	Breaks (Days)	Sessions per Day
Jake	11	8	0	1 – 2
Guppy	8	8	0	1 -2
Peanut	14	10	1	1-3
Marley	11	11	5	1-2
Sappy	13	11	5	1-2
Tina	23	19	11	1-2
Joe	22	18	11	1-2

Training Days and Sessions

A mean of 12 days was taken to train loading with a range of 8 to 19 days, a median of 11 and a mode of 8 and 11.

A mean of 14.5 sessions was taken to train loading with a range of 8 to 23 sessions, a median of 13 and a mode of 11.

Interobserver Agreement

Table 8 shows a summary of the data obtained for interobserver agreement (IOA) across 100 percent of baseline sessions and approximately 40 percent of each horse's training sessions.

IOA for Jake was collected for 45% of all training sessions. IOA for Guppy was collected for 50% of all training sessions. IOA for Tina was collected for 43% of all training sessions. IOA for Joe was collected for 41% of all training sessions. IOA for Peanut was collected for 34% of all training sessions. IOA for Marley was collected for 45% of all training sessions. IOA for Sappy was collected for 46% of all training sessions.

Table 8. Interobserver Agreement

Horse	**Baseline**	**Training**
Jake	87%	90%
Guppy	88%	100%
Peanuts	81%	93%
Tina	97%	89%
Joe	94%	91%
Marley	70%	100%
Sappy	90%	94%

IOA baseline for Marley scored 70% agreement. This was due to some discrepancies with definitions of turning and backing behaviour. This was discussed with the observer and definitions were amended for future analysis (Appendix F).

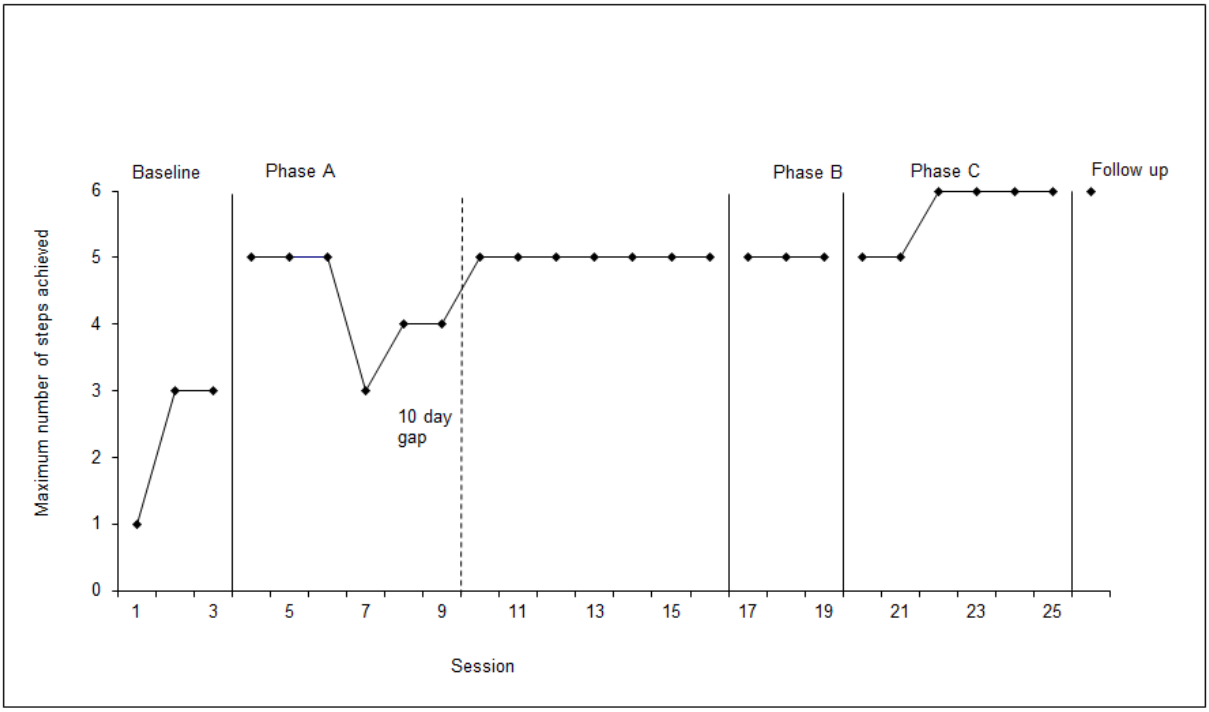

Figure 1. The maximum number of loading steps achieved during baseline, training and follow up for Joe.

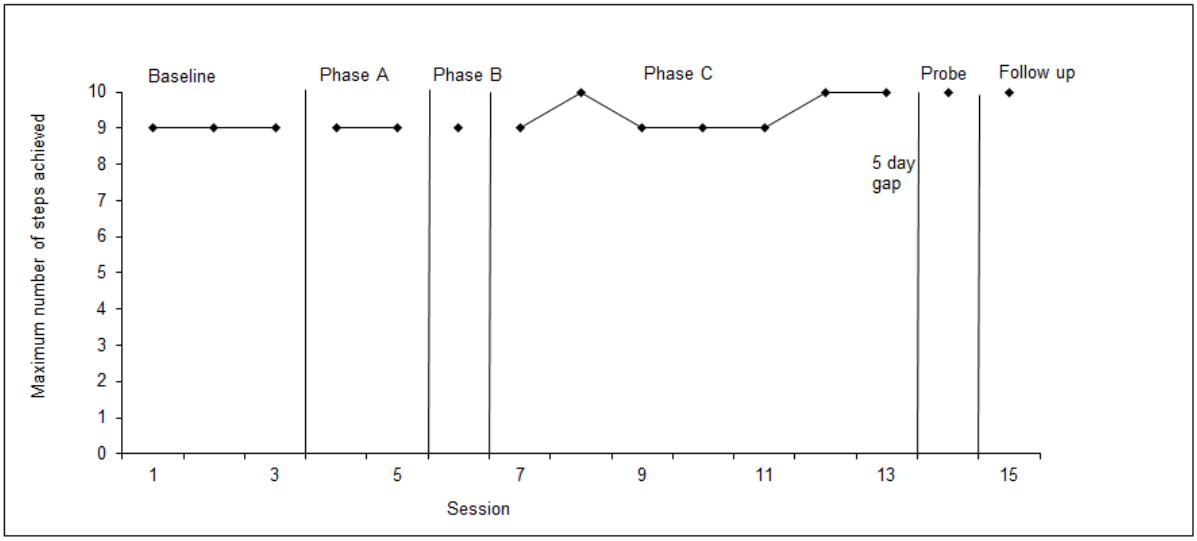

Figure 2. The maximum number of loading steps achieved during baseline, training and follow up for Marley.

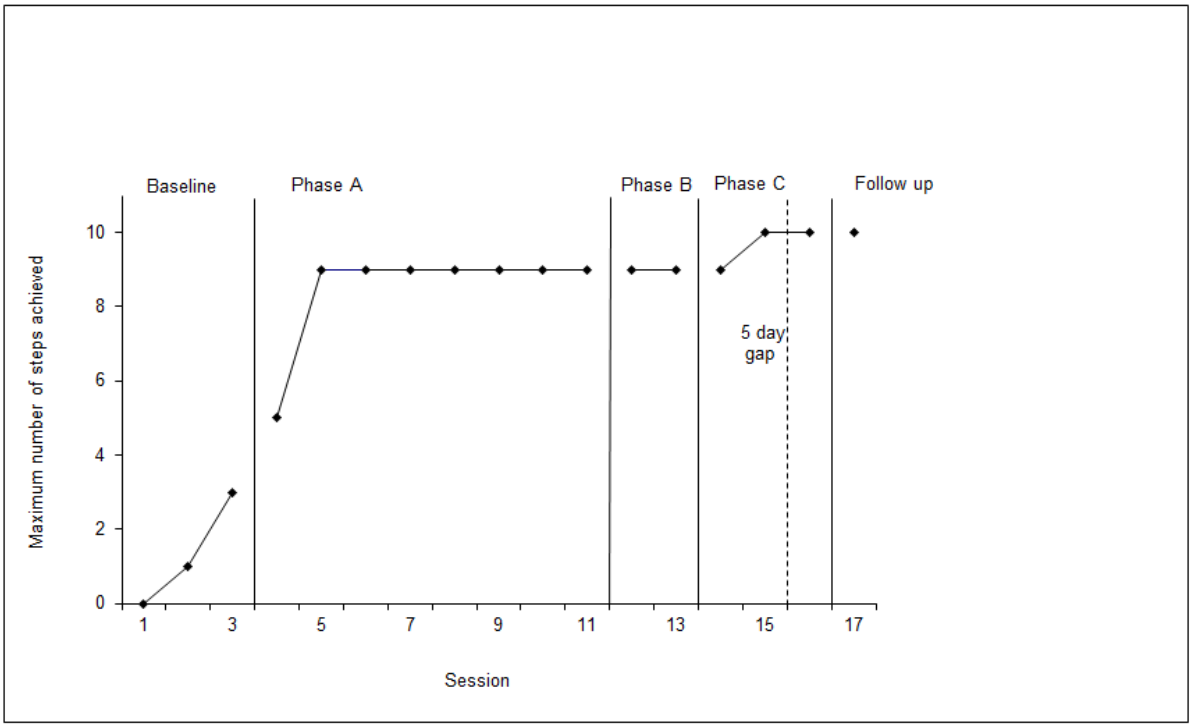

Figure 3. The maximum number of loading steps achieved during baseline, training and follow up for Sappy.

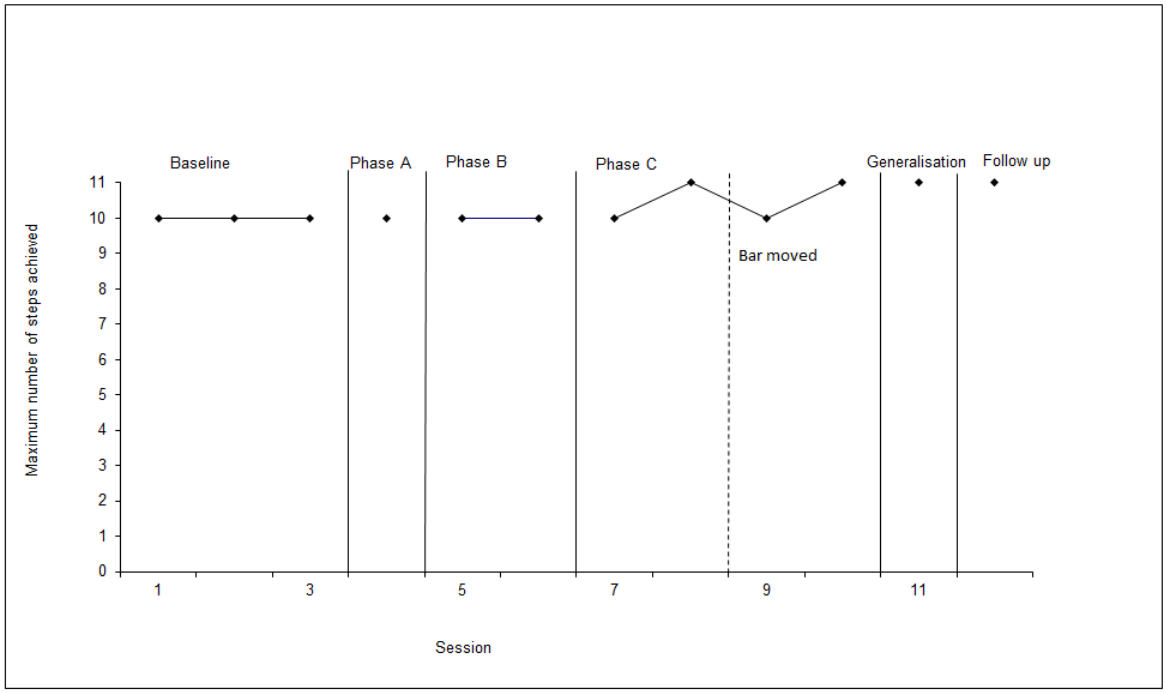

Figure 4. The maximum number of loading steps achieved during baseline, training and follow up for Guppy.

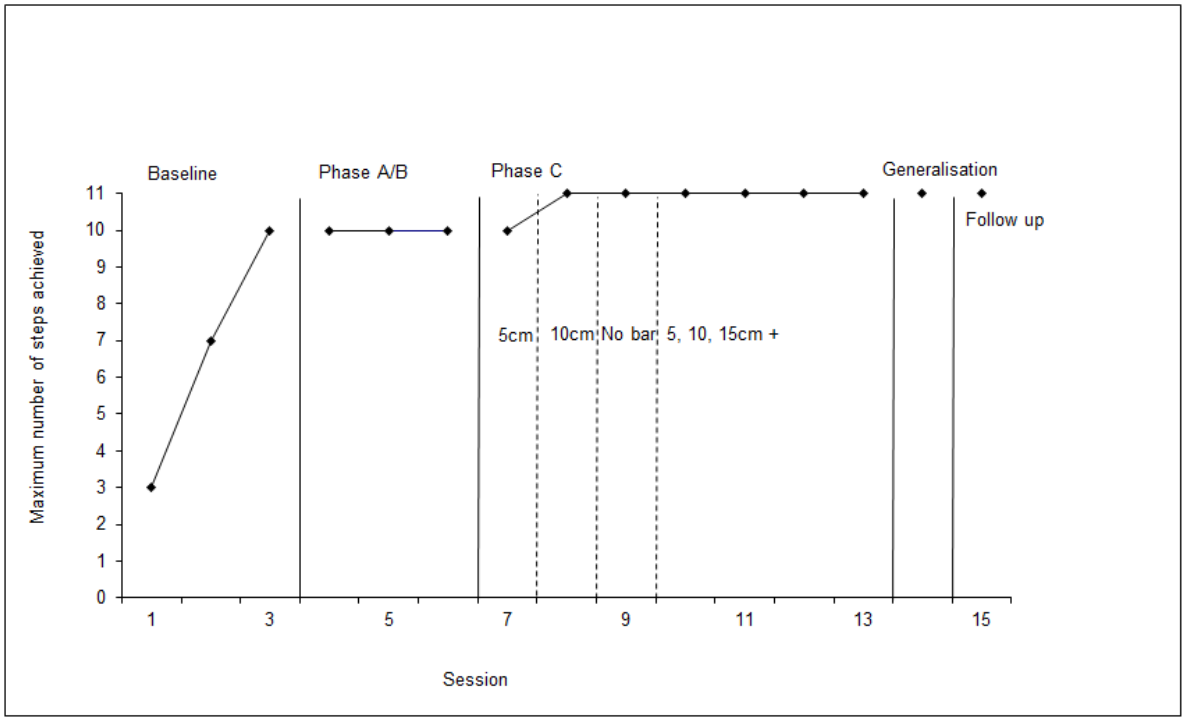

Figure 5. The maximum number of loading steps achieved during baseline and training for Jake.

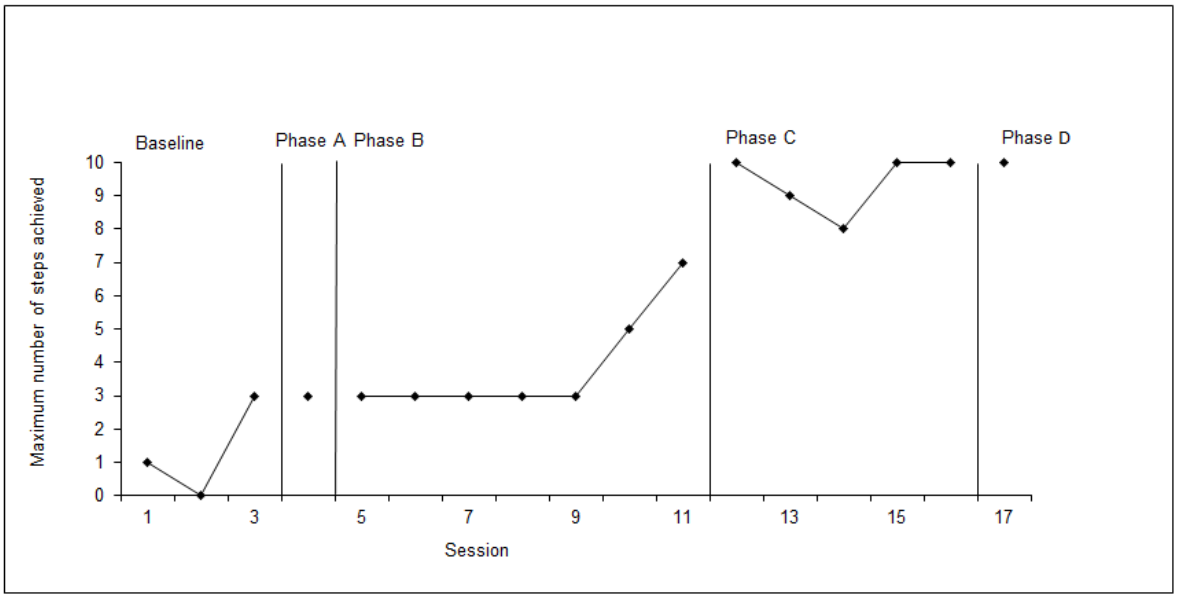

Figure 6. The maximum number of loading steps achieved during baseline and training for Peanuts.

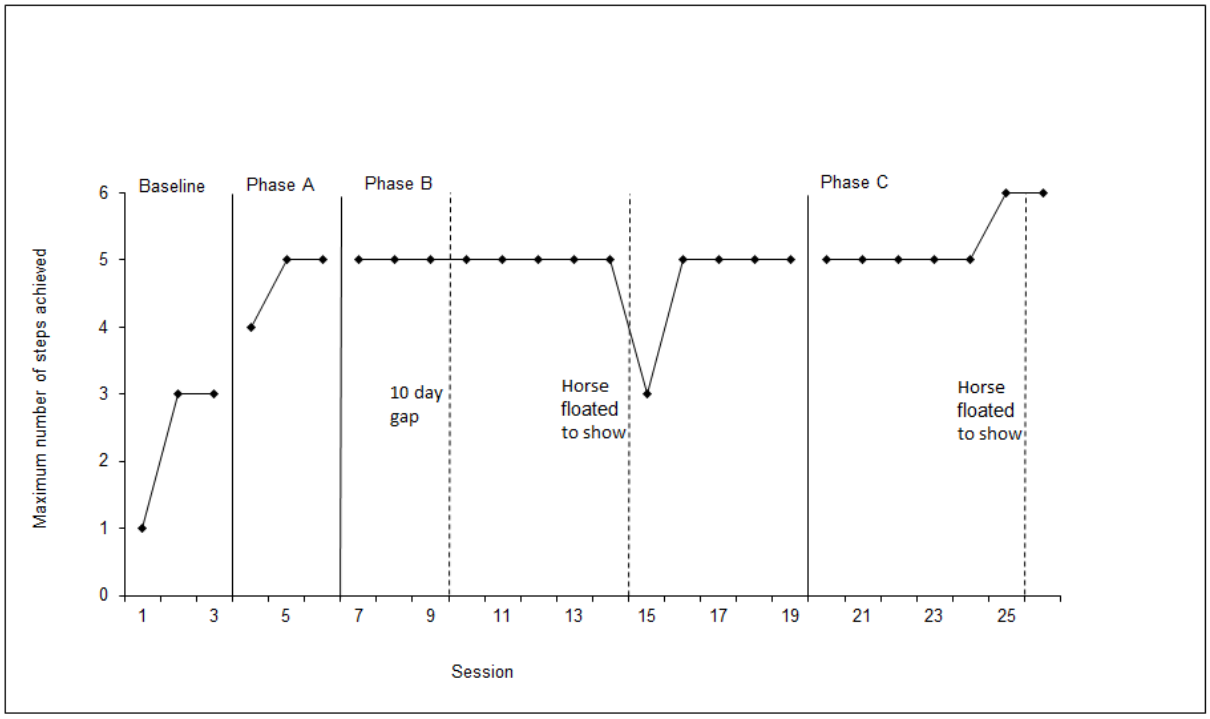

Figure 7. The maximum number of loading steps achieved during baseline and training for Tina.

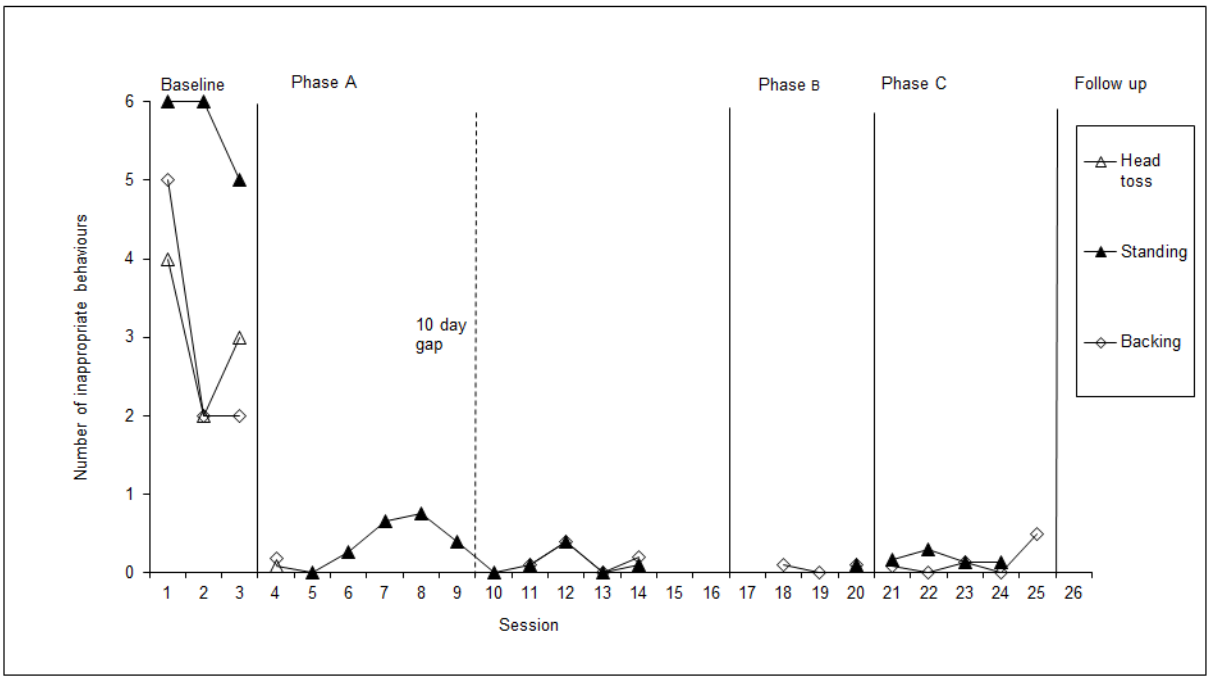

Figure 8. The number and type of inappropriate behaviours recorded during baseline, training and follow up for Joe.

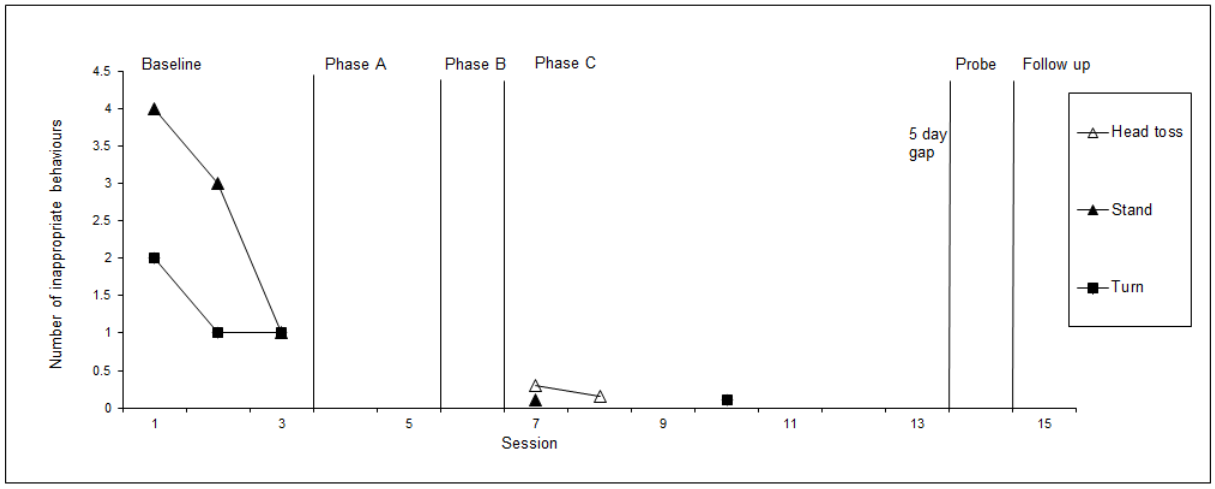

Figure 9. The number and type of inappropriate behaviours recorded during baseline, training and follow up for Marley.

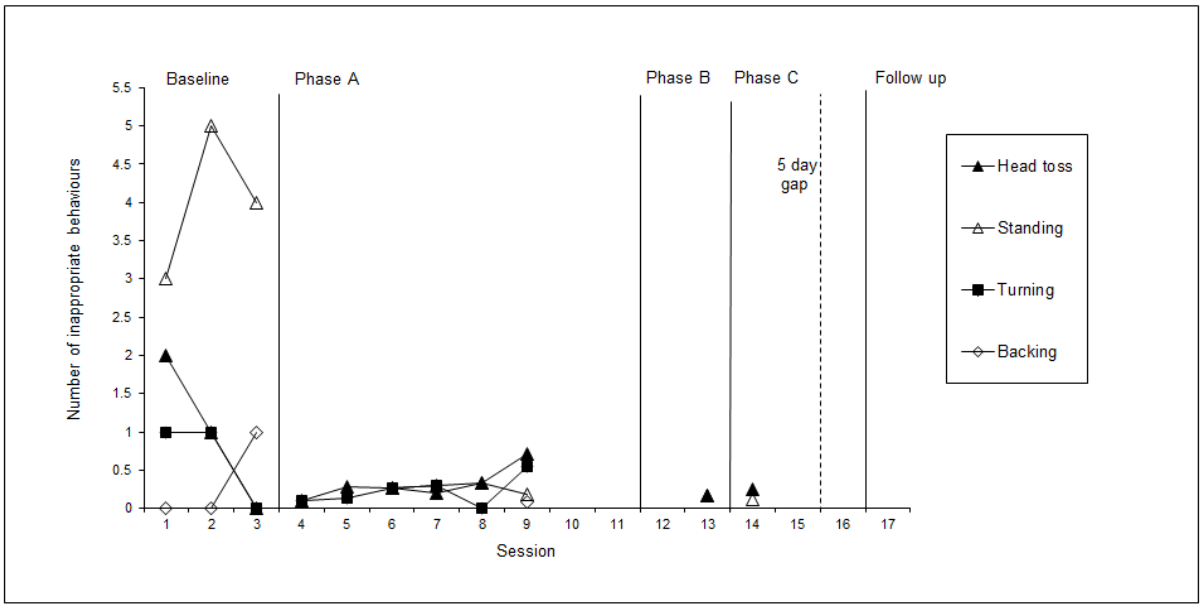

Figure 10. The number and type of inappropriate behaviours recorded during baseline, training and follow up for Sappy.

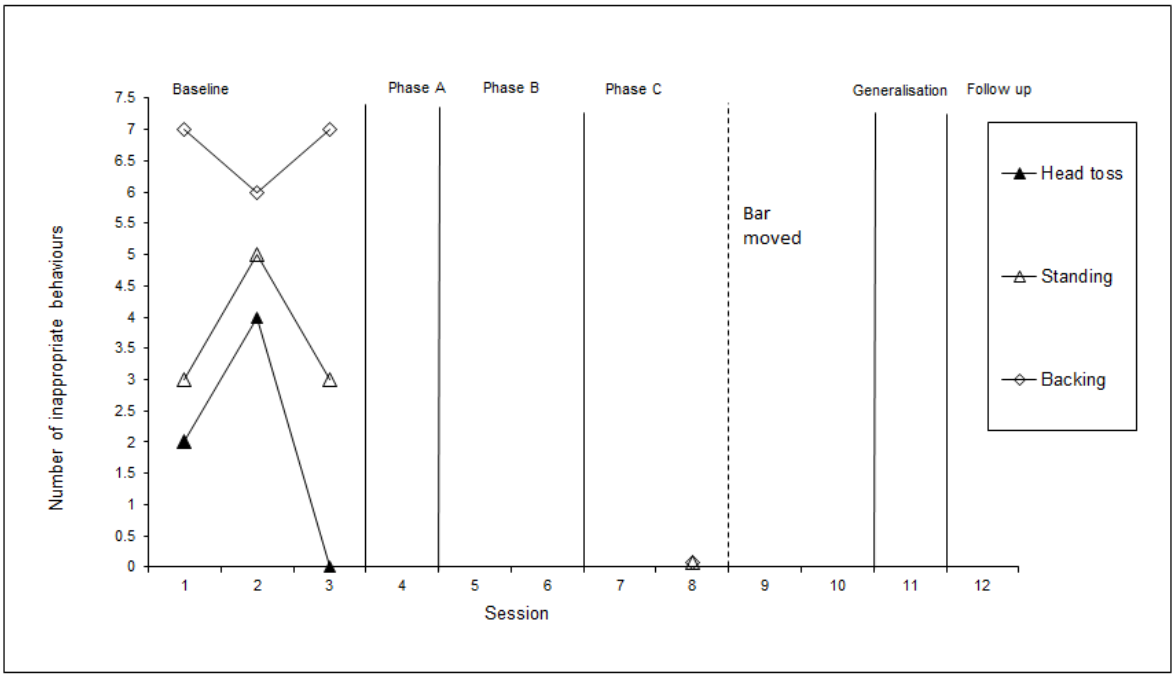

Figure 11. The number and type of inappropriate behaviours recorded during baseline, training and follow up for Guppy.

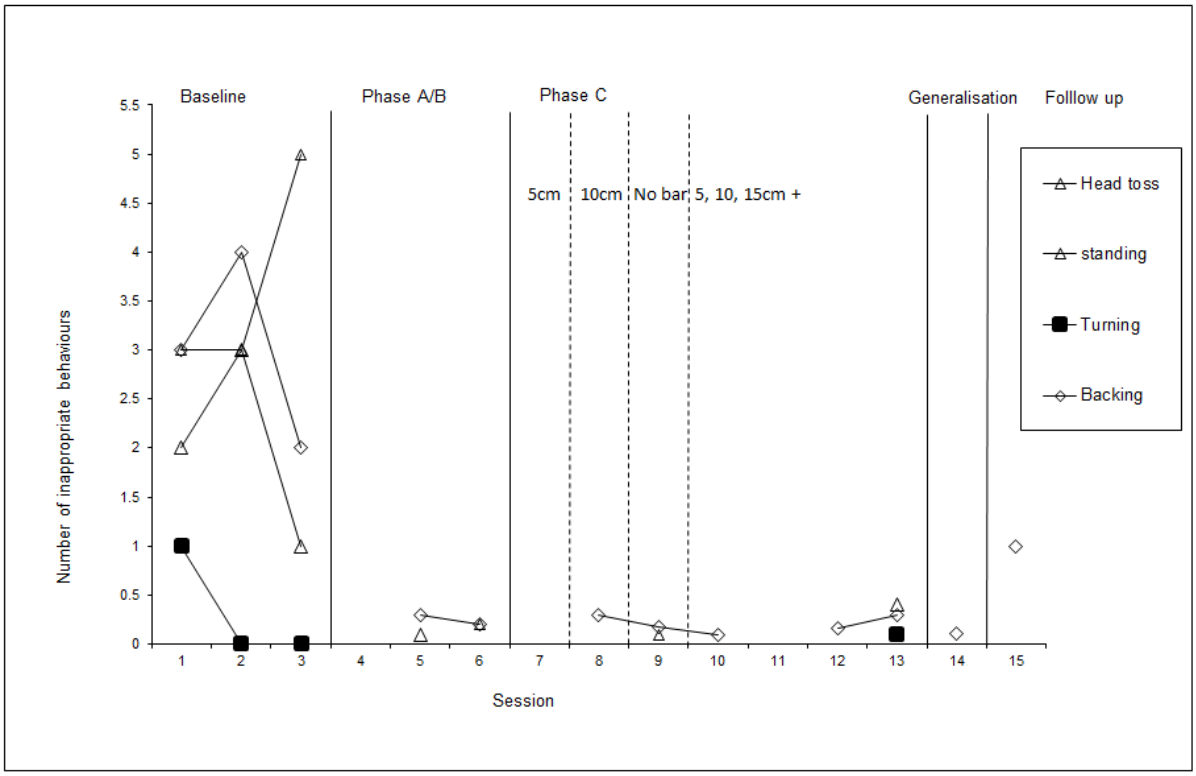

Figure 12. The number and type of inappropriate behaviours recorded during baseline, training and follow up for Jake.

Follow up indicates probe sessions conducted nine months after training began. Generalization refers to the float being moved for Guppy and Jake. The measurements indicate the distance the dividing bar was moved for Jake during training.

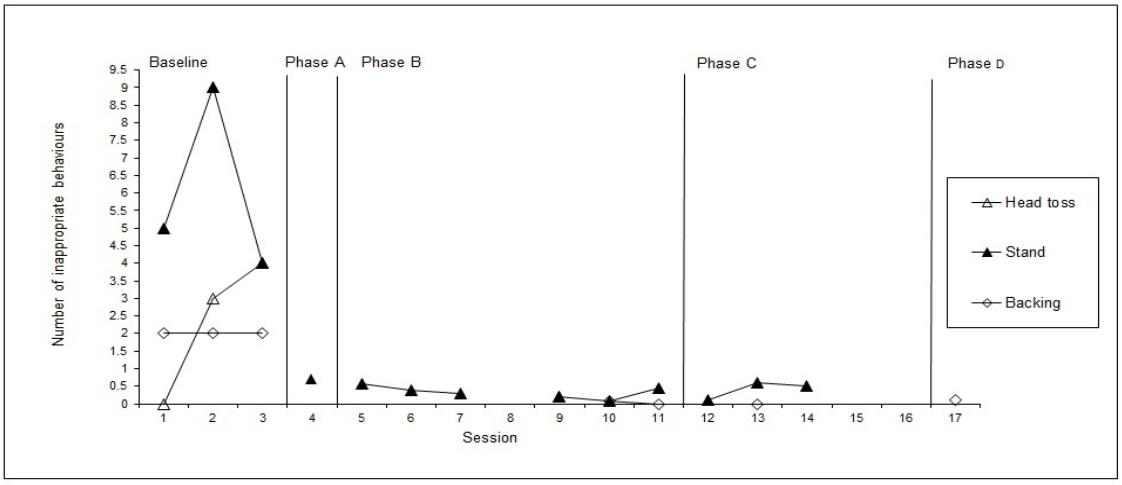

Figure 13. The number and type of inappropriate behaviours recorded during baseline and training for Peanuts.

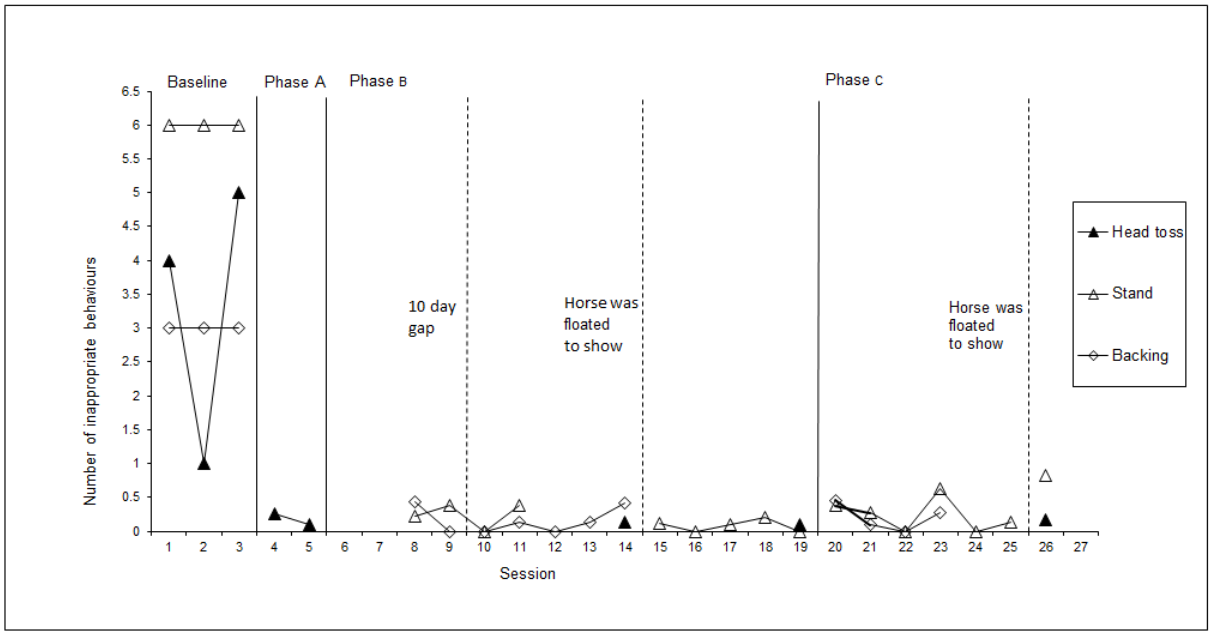

Figure 14. The number and type of inappropriate behaviours recorded during baseline and training for Tina.

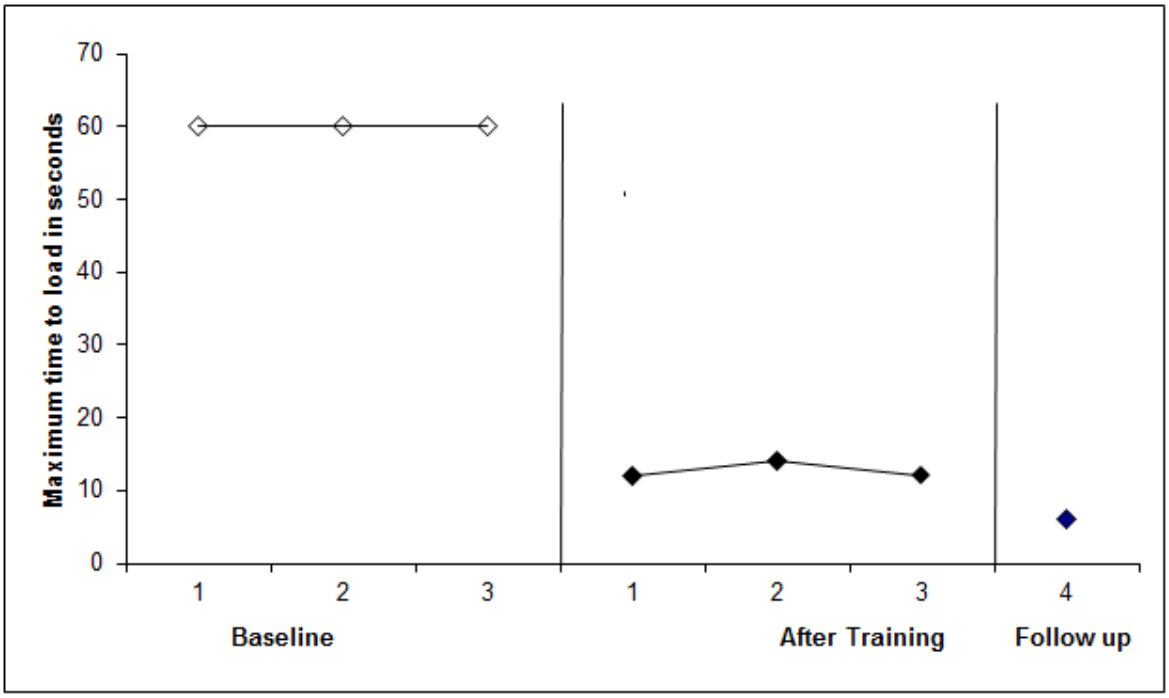

Figure 15. Time to load in seconds for Joe during baseline, after training and follow up.

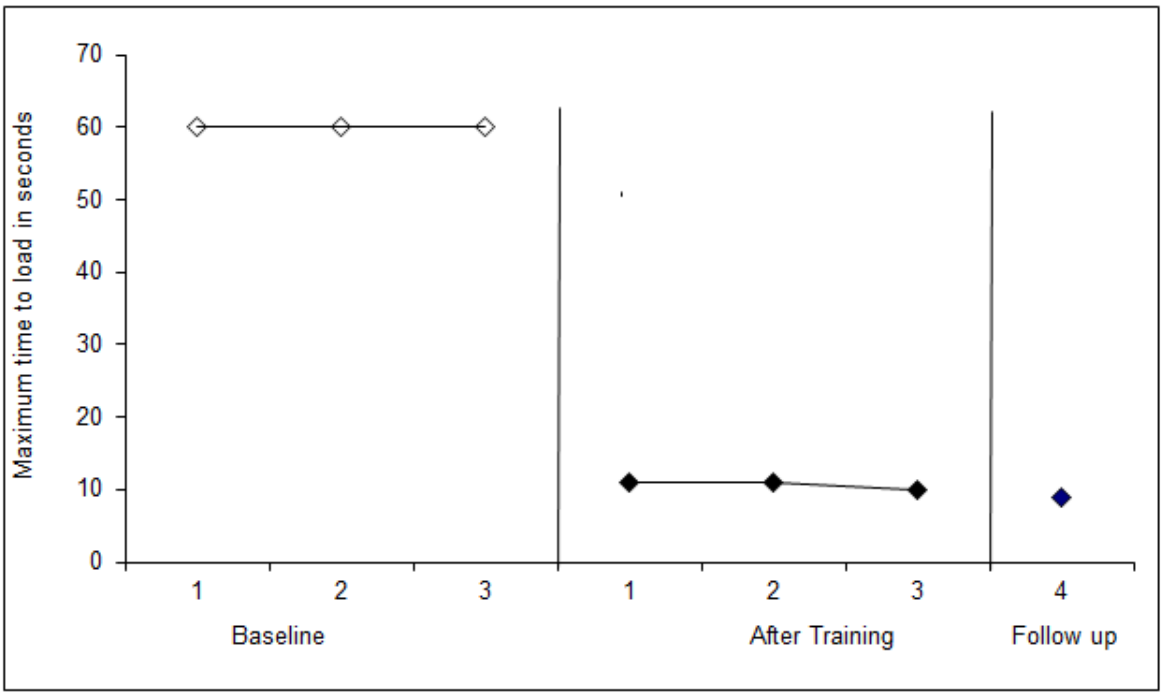

Figure 16. Time to load in seconds for Marley during baseline, after training and follow up.

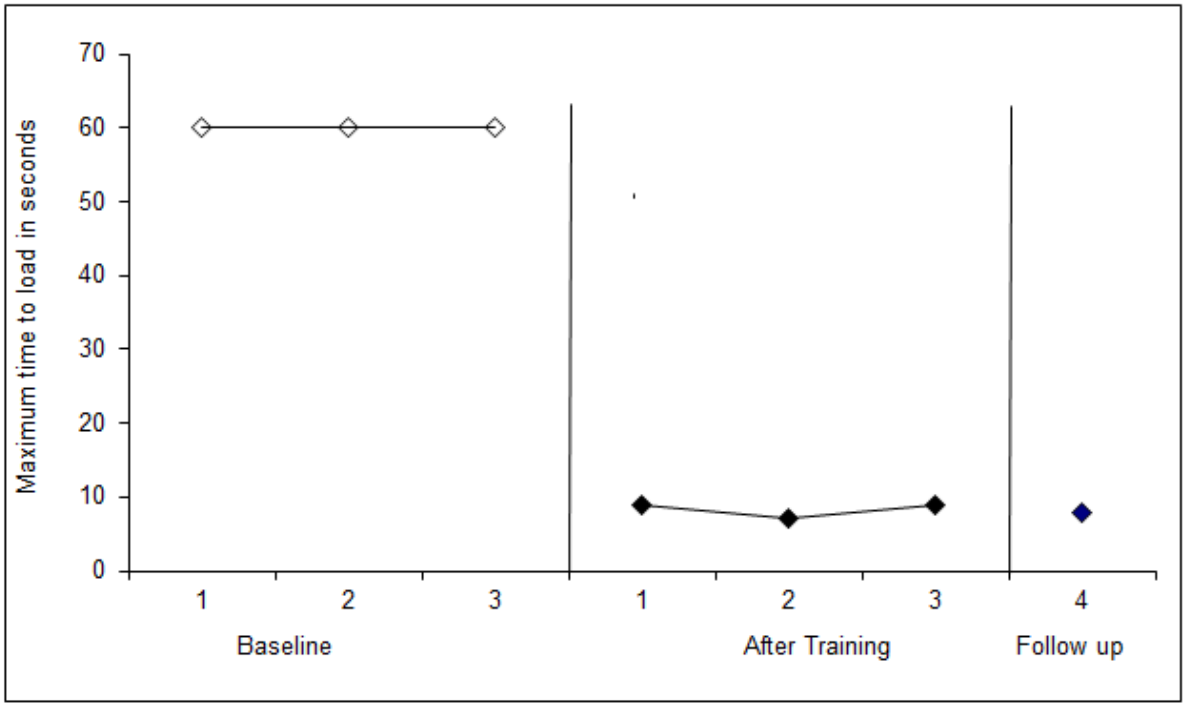

Figure 17. Time to load in seconds for Sappy during baseline, after training and follow up.

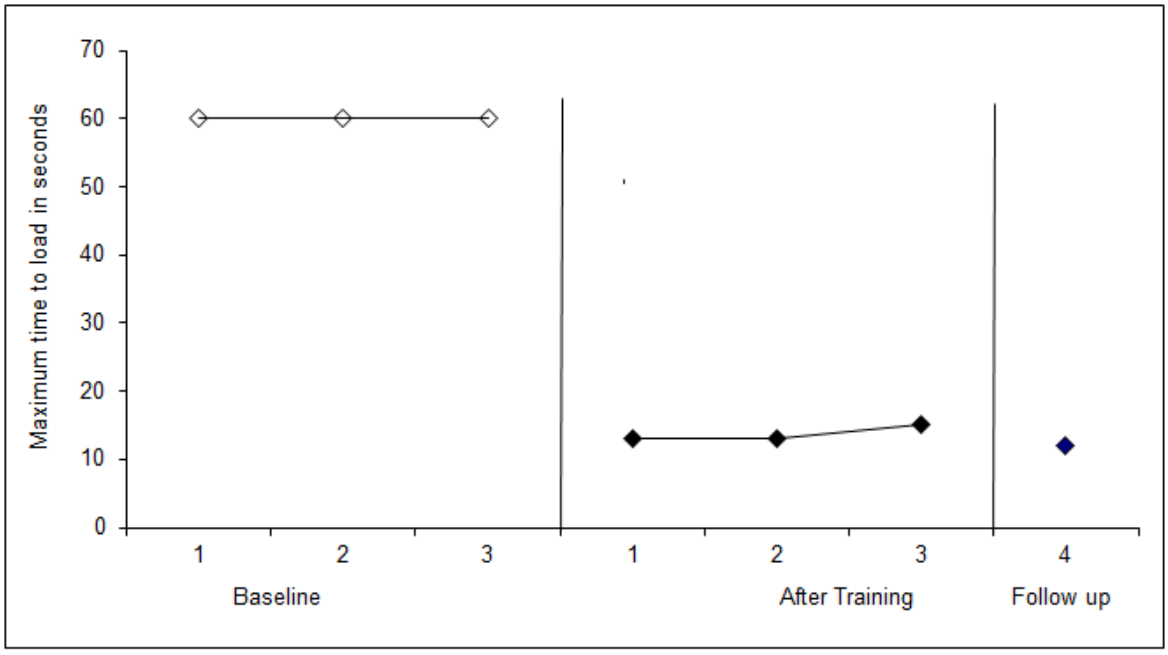

Figure 18. Time to load in seconds for Guppy during baseline, after training and follow up.

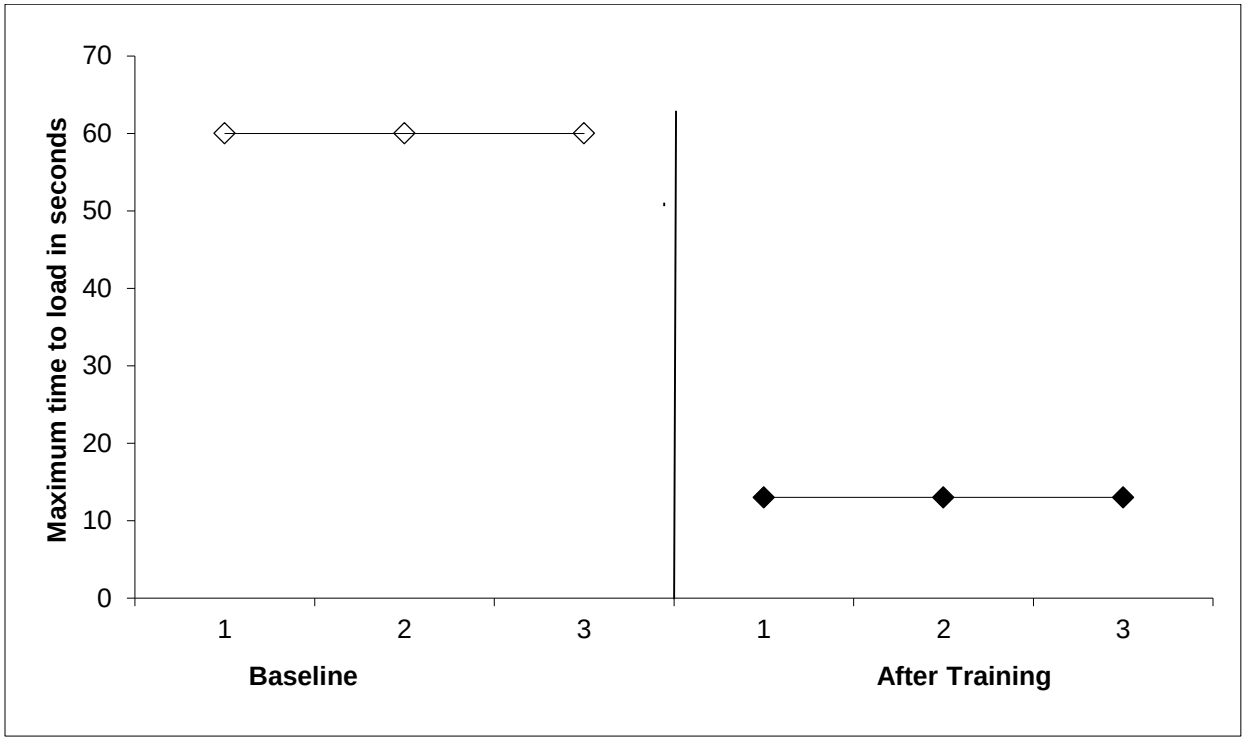

Figure 19. Time to load in seconds for Jake during baseline and after training.

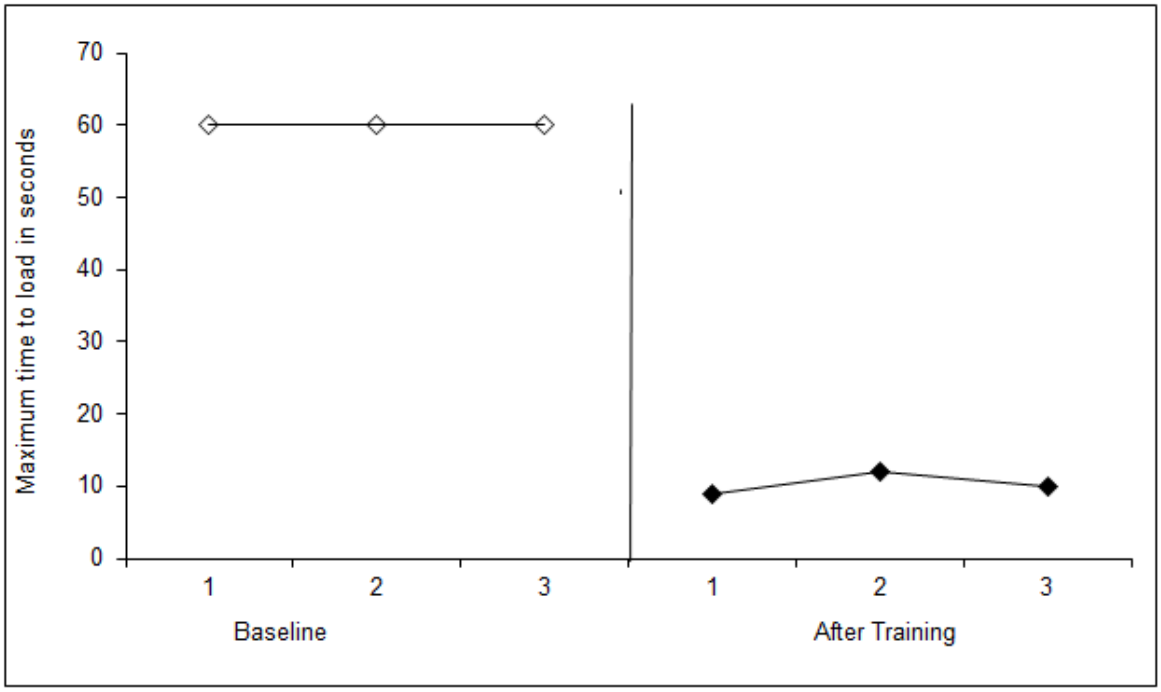

Figure 20. Time to load in seconds for Peanuts during baseline and after training.

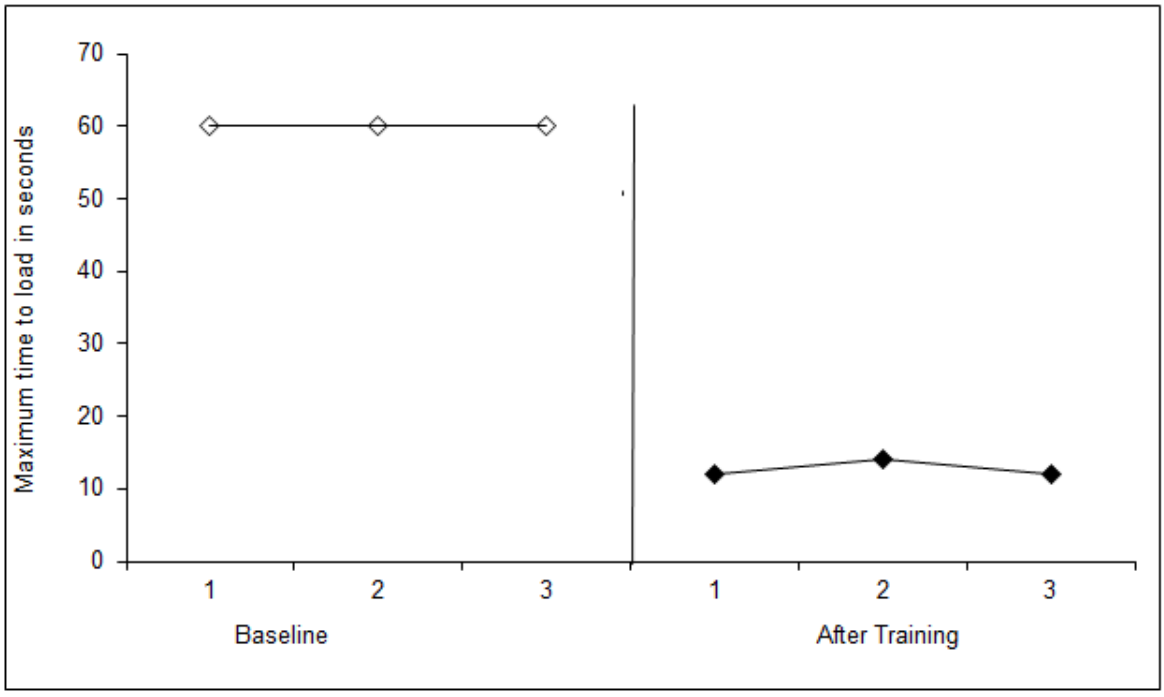

Figure 21. The time to load in seconds for Tina during baseline, and the final three trials before she was withdrawn from the study.

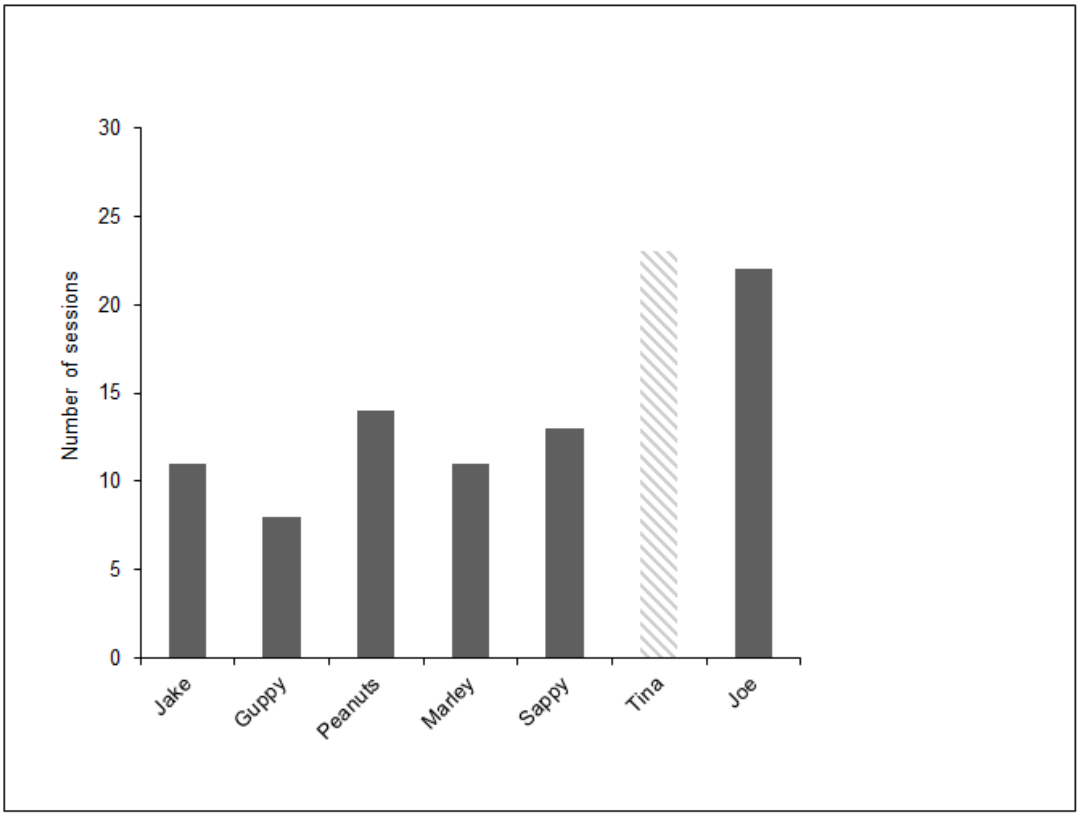

Figure 22. The total number of float loading training sessions for each horse to reach terminal loading criteria.

Terminal loading included standing for 10 seconds for three consecutive trials across two consecutive sessions. The shaded bar indicates Tina reached initial loading criteria - loading and standing for 10 seconds for three consecutive trials in one session.

Discussion

Float loading horses can be dangerous for both horse and owner, and horse welfare is frequently compromised with the use of aversive techniques (Ferguson & Rosales-Ruiz, 2001; Hendriksen et al., 2011; Slater & Dymond, 2011). Slater and Dymond provided evidence that positive reinforcement and target training can increase loading behaviours and reduce inappropriate behaviours. Slater and Dymond suggested that future research might consider training the owners to carry out the procedures. This project replicated and extended Slater and Dymond's study. ABA methodology and principles of behaviour were used to teach owners to train their own horses with problem behaviours to load on to a float. Positive reinforcement with a secondary reinforcer was chosen for both ethical and safety reasons (Brando, 2012; Hendriksen et al.). The target training procedure selected was based on previous findings that showed horses with problem behaviours could be trained to load successfully using differential reinforcement and a target (Ferguson & Rosales-Ruiz; Slater & Dymond). Both studies mentioned that loading is a dangerous procedure potentially, for a single person. The procedure used in this study enabled a single person to safely and effectively load a horse within 15 seconds, without entering the float.

Summary of Findings

During baseline none of the horses would enter the float and stand for 10 seconds to allow the back bar to be fastened. Following training all seven horses loaded within 15 seconds and stood untied for 10 seconds. Training generalized to different locations, and data collected up to nine months after training shows loading behaviour was maintained for Guppy, Joe, Marley and Sappy. Follow-up data for Jake showed that although he would load and stand for 10 seconds he started to back when the dividing bar was moved. Follow up data was not collected for Peanuts.

She reached terminal criteria but backed under the back chain immediately afterwards. Her owner took her back to initial training to reestablish loading. Tina was the only horse withdrawn from the study as she was loaded for events during the training, confounding her results.

The results of this study indicate that all owners were able to master classical conditioning, target training and the shaping skills required to train their horses. Behavioural Skills Training and behavioural principles were employed to train the owners and the results suggest these procedures were both effective and efficient. The results show that behaviour-analytic techniques can be taught to owners over a short period of time, enabling them to increase loading behaviours without the use of aversive stimuli (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011). Although positive reinforcement and target training increased appropriate loading behaviours, there is evidence to suggest some inappropriate behaviours may continue although with reduced frequency and severity. The results and implications of training people to train their horses using positive reinforcement will be discussed in more detail, followed by the study's limitations and strengths, and suggested future research.

Positive Reinforcement and Training Welfare

Positive and negative reinforcement both serve to increase the likelihood of future behaviour. When negative reinforcement is applied correctly the aversive is removed contingent on the desired response (J. O. Cooper et al., 2007). With the correct use of positive reinforcement a reinforcer is obtained contingent on the desired response (J. O. Cooper et al.). Horses are generally trained using negative reinforcement, however, studies have suggested that unlike negative reinforcement, positive reinforcement may be more effective in stressful situations (Hendriksen et al., 2011; Innes & McBride, 2008). Float loading is potentially a stressful experience for horses and owners. Float interiors are often dark and restricted, and not a natural

environment for a horse (Ferguson & Rosales-Ruiz, 2001; Goodwin, 1999). The addition of an aversive stimuli when loading horses may increase inappropriate behaviours and compromise the horse's welfare (McGreevy & McLean, 2009; Waran et al., 2007). According to some studies, less aversive training methods may be more effective in increasing appropriate loading behaviour (Ferguson & Rosales-Ruiz; Shanahan, 2003; Slater & Dymond, 2011). Other studies have shown that positive reinforcement may increase positive interactions between horse and owner (Birke, 2007; Brando, 2012; Innes & McBride). Heleski and colleagues found no significant difference between using positive and negative reinforcement, however they did note the addition of positive reinforcement appeared to calm horses and may be safer for handlers to apply (2008). The results of this study showed that loading behaviours increased for all horses, including those with previous negative loading experiences. Horses approached the float voluntarily in order to touch the target and showed less avoidance behaviours during training. This supports the findings of Innes and McBride who noted that ponies trained with positive reinforcement showed more approach behaviours when placed in potentially frightening situations.

Three of the horses had experienced what might be termed excessive negative reinforcement in order to get them to load – this entailed either being pushed onto the float or having a whip held out to drive the horse on to the float. One of the owners did not feel that the presence of the whip was excessive and said she would probably continue to use it with a difficult horse. The correct application of negative reinforcement should take the form of a gentle tug on the lead rope. Having to use additional tools or increasing pressure may lead to punishing the horse or negatively reinforcing inappropriate behaviour (McGreevy, 2007). It seems that some owners may habituate to the use of their own technique and view it as acceptable. The culture and

traditions of equitation may perpetuate the tendency to find aversive techniques acceptable because they are embedded into everyday practice for many horse owners (Birke, 2007)

Innes and colleagues (2008) used positive reinforcement and a secondary reinforcer with previously abused horses in rehabilitation training. They found that ponies trained with positive reinforcement showed more explorative behaviours towards novel stimuli and strange handlers. Under the same conditions, the ponies trained with negative reinforcement showed more avoidance behaviours (Innes & McBride). The results of the current study support these findings and suggest that negative reinforcement applied during loading, may contribute to inappropriate behaviours for some horses. Peanuts, Jake and Tina, had experienced falls or accidents in floats, and displayed avoidance behaviours in baseline such as backing and standing. Following training Tina and Jake's inappropriate behaviors decreased and loading behaviours increased immediately. It took longer to increase loading behaviours for Peanuts but her inappropriate behaviours reduced significantly following target training. Target training appeared to encourage approach behaviours that competed with standing and backing behaviours, although all three horses continued to display minimal levels of inappropriate behaviours across training (Ferguson & Rosales-Ruiz, 2001). Peanuts took six loading sessions to move beyond baseline responding which could have been the result of the number of sessions. Peanuts' owner was available for only two weeks so the training had to be condensed and she received up to three sessions a day. Previous research suggests that extended training periods may decrease equine learning efficiency (McCall, 1990). Nonetheless, inappropriate behaviours reduced to minimal levels when compared to baseline, but continued throughout training until Session 15. Training preliminary loading behaviours such as backing and standing may have helped to shape Peanuts appropriate loading behaviours more rapidly (Pohjola, 2011; Shanahan, 2003). Although

reinforcers were varied she may have benefited from even more variety by establishing a hierarchy of preferred foods (Armistead, 2009). Conducting a preference test before training is time consuming for horses and the results for the other horses in the current study suggest it is not essential for successful training (Armistead). The data suggest that total elimination of some behaviours is unlikely in some cases, however positive reinforcement was used effectively to shape approach behaviours in these three rehabilitated horses (Ferguson & Rosales-Ruiz; Innes & McBride).

Anecdotal observations of owners suggest that the experience was less stressful for them as well. One owner had demonstrated frustration during baseline, pulling on the lead rope and giving detailed explanations for the horse's inappropriate behaviour. As the horse's appropriate loading behaviours increased, the owner began verbally praising the horse during the sessions. Another owner verbally recounted her previous experiences loading the miniature donkeys, saying she felt anxious and stressed using physical force to get the donkeys in the float. She emailed the researcher after training, explaining how she could now load the donkeys with no ropes (Appendix M).

These results support Innes and McBride's findings and suggest that for horses with a history of mistreatment or negative loading experiences, the application of positive reinforcement may encourage appropriate float loading behaviour such as exploratory behaviour or forward movement (2008). The results also suggest that using positive reinforcement may improve equine welfare. Owners may be less likely to use aversive techniques, having achieved success with positive reinforcement, and using positive reinforcement with a secondary reinforcer appears less stressful for handlers and horses in stressful situations (Hendriksen et al., 2011; Innes & McBride).

Advantages of Training Horses Using Positive Reinforcement

A key advantage of applying positive reinforcement over more traditional training is there is less likelihood of the horse displaying dangerous behaviours as a result of the increase in pressure or aversive stimuli. An aversive stimuli may be increased following no response to a request to enter the float, however with positive reinforcement the reinforcer is simply withheld following no response (Ferguson & Rosales-Ruiz, 2001). Another consideration is the horse may associate the trainer or owner with the aversive stimuli through classical conditioning. The use of positive reinforcement, as stated above, may help the horse to associate the owner with positive experiences and improve horse/owner interaction. This may be beneficial for rehabilitating horses, and for training inexperienced horses.

Joe was the only naïve horse in the study. He was the youngest of the five horses and had not been backed for riding. Joe had no previous loading experience so the addition of positive reinforcement enabled the experience to be highly reinforcing straight away. His owner said he had seemed curious and she had led him up to the float before taking part in the study. The task analysis of the loading procedure enabled discrete steps to be identified and trained with the target. Joe's owner was able to provide reinforcement for any approach behaviours towards the float, once initial target training had been completed. The data show he completed five of the six loading steps immediately following target training. During baseline the application of negative reinforcement had not reduced inappropriate backing or increased appropriate loading behaviours. Unlike negative reinforcement, positive reinforcement was effective in eliminating Joe's inappropriate backing behaviour during training. The float used in training Joe and Tina did not have a ramp and the horses had to step up into the float, and then step back and down to exit the float. Joe backed off the float quickly almost tripping during initial float training, which

may explain the reduction in loading behaviours in Session 7. Based on this observation the loading procedure was analysed and a task analysis revealed additional steps that might improve the procedure. The procedure was modified in Sessions 8 and 9 to include reinforcement for each individual step backwards. This helped to slow Joe's backing response and the owner included positive reinforcement for the completed backing behaviour. This backing step could have been taught separately before the float training. Training him to step up, and back down off a raised platform in the open may have been useful preliminary training (Shanahan, 2003).

Comparing Negative and Positive Reinforcement

All the horses displayed problem behaviours which were frequently followed by an increase in an aversive stimuli. Baseline data suggest that inappropriate behaviours for Jake, Tina, Peanuts and Sappy were negatively reinforced. Sappy, unlike the other three horses, had no obvious negative experience with loading but his standing behaviour prevented him from fully loading. His owner was unable to apply enough sustained pressure to increase forward movement. Following target training Sappy loaded within two sessions and his avoidance behaviours of turning and standing reduced to minimal levels. The training results suggest that the removal of the aversive stimuli and the application of positive reinforcement reduced the problem behaviour in all four animals. This supports findings in previous studies where the inappropriate behaviours were not targeted for reduction but reduced to zero during training (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011, p333).

Hendriksen (2011) compared negative reinforcement with positive reinforcement when training horses to float load and found that horses trained with positive reinforcement loaded quicker and with less stress-related responses than horses trained with negative reinforcement. In the current study although the use of negative reinforcement in baseline appeared to increase

avoidance behaviours, none of the horses displayed any of the stress-related behaviours such as tail whipping or eye whitening, noted in Hendriksen's study. This may suggest that the horses were not stressed, however Brando (2012) states the more an animal tries to avoid a situation the more likely its welfare is being compromised. Recording baseline behaviours before, during and after training enabled all avoidance behaviours to be measured (Brando). Although heart rate and other behaviours may be general indicators of stress, the results of this study supports Brando's comment that individual avoidance behaviours also provide a useful assessment of the likely welfare state of a horse. As the current study shows these avoidance behaviours are both observable and measurable, and they don't require special monitoring equipment (Hendriksen et al.). For example owners trying to administer a technique may find it easier to note specific behaviours rather than monitor heart rate. Eye whitening and nostril widening may also be indicative of other none related environmental factors such as increasing heat or attempting to see when vision is restricted (Hendriksen et al.).

During baseline, all of the horses failed to load within one minute with the application of negative reinforcement alone. For Peanuts, Jake and Tina the use of negative reinforcement during baseline did not increase loading behaviour. As stated earlier, all three horses had previous negative experiences with float loading. Their inappropriate avoidance behaviours, backing or standing, appeared to be negatively reinforced by the owner's response of pulling on the lead rope (Brando, 2012). The owners could not maintain the pressure long enough in order to load the horse (Fox et al., 2012). Marley, Sappy, and Guppy had no recorded bad experiences with loading, but their inappropriate behaviours may have been the result of poor handling, as suggested by Waran (2005).

Another explanation for these findings could be the owners were using negative reinforcement incorrectly during baseline (Waran et al., 2007). Hendriksen and colleagues (2011) noted that owners in their study may have contributed to loading difficulties by getting frustrated and giving poor, inconsistent cues. Training the horses using positive reinforcement may have clarified the cues and made learning easier for the horses (Hendriksen et al.). In the current study the results indicate that correct application of positive reinforcement increased appropriate loading behaviours, which may have helped reduce the owner's frustration (Hendriksen et al.). Hendriksen and colleagues noted that the difficulties associated with negative reinforcement could lead to the conclusion 'that only trainers with extensive knowledge and experience should use the NR procedure' (p. 265). All owners in this study were experienced horse owners who had been using negative reinforcement for a number of years. If all of them were using it incorrectly despite this experience it would seem that even experience is no guarantee of accurate use (Warren-Smith & McGreevy, 2008). Following video modeling and role rehearsal, the owners applied positive reinforcement correctly which resulted in an increase in loading behaviours and an immediate reduction in inappropriate behaviours for all horses except Peanuts. This shows that owners can be taught quickly and efficiently how to apply this training procedure. The six horses that reached loading criteria with target training and positive reinforcement, loaded within 15 seconds and stood untied for 10 seconds while the owners fastened the back bar (Brando, 2012). It could be argued that negative reinforcement might be trained as quickly using video modeling and role rehearsal, however, negative reinforcement may not be the most appropriate training method for training problem loaders as noted earlier.

The results of this study show that using ABA methodology provided owners with a clear, systematic procedure that may help reduce owner frustration. The owners' correct responses

were reinforced with both feedback from the researcher, and the horses' compliance (Adams et al., 1980). This supports previous research that suggested horses load more willingly and owners appeared less frustrated using positive reinforcement (Heleski et al., 2008; Hendriksen et al., 2011).

Secondary Reinforcement and Reinforcers

Three advantages of a secondary reinforcer were highlighted in this study. First, the addition of a secondary reinforcer enabled the owner to safely load their horses and fasten the back bar without the need to enter the float. Although owners did enter the float initially, this was done with all dividers removed making escape easier for the owner. Second, using the secondary reinforcer avoided the temporal delay between the appropriate behaviour and the delivery of the primary reinforcer. Third, horses could be trained from a distance to enter the float, and the secondary reinforcer enabled reinforcement to be signaled immediately. Peanuts was trained to enter a single float and a person could not enter the single float safely. A target was mounted on a pole held by a second person who stood at the front of the float and was protected by the breast bar. The secondary reinforcer was used to mark each step as Peanuts entered the float. Anecdotally, the use of a secondary reinforcer appeared to improve owners' timing and encourage them to focus on the desired behaviour. For example owners started to comment on what their horses were doing correctly and to require less reminding to click at appropriate moments.

Williams (2004) compared using a secondary reinforcer and primary reinforcer, with primary reinforcement only to train horses to touch a target. Williams stated that the addition of a secondary reinforcer did not affect the time taken to train horses to touch the stationary target.

The results of this study discussed above, indicate that in an applied setting there may be other benefits to incorporating a secondary reinforcer.

Neither Guppy nor Marley had experienced any negative experiences according to their owners but they wouldn't stay in the float after loading. Target training and 'hold on target' helped to eliminate their backing and turning behaviours once they had loaded. This process was made easier with the addition of a secondary reinforcer. For example once the horse was loading and touching the stationary target inside the float, the hand held target was faded out. Then the owner was faded out of the float in progressive steps until they could stand in the door point to the stationary target, saying target. The horse was trained to hold on the target for 10 seconds to allow the owner time to close the back bar and go round to the groom entrance, click and feed the horse. Without the clicker it would be much harder to leave the horse and enter the groom entrance without the horse backing off the float.

Owners were instructed to deliver one food reinforcer after each click on a continuous schedule of reinforcement, for two reasons. First, continuous reinforcement is recommended for difficult tasks and loading was considered difficult for these horses (J. O. Cooper et al., 2007). Second, it was anticipated that in the natural environment owners may not want to, or remember to, feed every click and therefore by default they may reinforce behaviour on an intermittent schedule (Ferguson & Rosales-Ruiz, 2001; J. L. Williams et al., 2004). The maintenance instructions given to owners outlined the need to consider changing reinforcers if they noticed any behavioural changes after the completion of training (Armistead, 2009). Owners were encouraged to consider their horse's food preferences, and informed that these preferences may change over time (Armistead).

Applied Behaviour Analysis and Training People

Research has indicated that some current equine training methods are detrimental to the welfare of horses. The owners' lack of knowledge about both the correct use of procedures, and alternative less aversive procedures may also contribute to poor handling of horses (Waran, 2005; Warren-Smith & McGreevy, 2008). Several authors have suggested that improving equestrians' knowledge of training techniques and the underlying principles of behaviour may also improve equine welfare (Goodwin et al., 2009; McGreevy, 2007; Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy). Research has shown that Behavioural Skills Training is effective in training inexperienced staff to learn and use new skills (Parsons et al., 2012). Several studies have shown that behaviour-analytic techniques can be taught to novice staff and parents to increase appropriate responding (Graudins et al., 2012; Najdowski et al., 2010; Severtson & Carr, 2012).

The aim of this study was to incorporate ABA methodology and BST to train owners in the natural environment to use an ethical training process for loading horses. This approach was chosen because research has shown training in the natural environment to be more effective than lecture or workshop methods alone (Parsons et al., 2012; Severtson & Carr, 2012). All owners were successful in training their horses. Some owners were faster at learning the techniques which may have reduced the number of training sessions. Jake and Guppy's handler had previous clicker experience and appeared to master the training methods faster than the other owners. For example she did not require as much 'in vivo' instruction. The results suggest that this approach was easy to administer for all owners regardless of the horses' age and experience or breed, as all horses reached the first level of terminal criteria. The comments and actions of the owners also suggest that the owner training generalized to other situations (Appendix J to N).

Four of the owners had other horses and reported examples of using the training with these horses. Mary shared her knowledge with her friend and together they started conditioning three other horses. Julie used target training to help train a yearling to float load and she used the target to train Joe to respond after she had backed him for riding. Lynn shared her experience with the Donkey Society which showed an interest in hearing more. Janine was experienced with the clicker but had not used a step by step procedure based on a task analysis. She started using the procedure to improve the loading behaviour of her other horse. The study showed that this procedure was safe for both horse and owner, was easy to learn and administer, and the results were maintained over time. The results also suggests that the correct application of positive reinforcement may reduce welfare concerns by removing the need to use aversive stimuli during loading (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011)

Problems Encountered

Studies have suggested that owner knowledge about training and principles of behaviour is limited. This study enabled owners to be active in the process, to ask questions and to have the training explained to them. The intention was to present both conceptual and procedural knowledge (Visser & Van Wijk-Jansen, 2012). Most of the problems associated with training inexperienced owners and horses, discussed earlier, were avoided. Video modeling and role rehearsal reduced the possibility of problems during training, and owners were encouraged to ask questions (Moore & Fisher, 2007). All owners practiced the steps prior to training their horses and received feedback during and after the session (Graudins et al., 2012). All horses showed reduced problem behaviours immediately following target training. One owner was 10 years old and had additional support during the process. This included physical guidance and verbal prompting from the researcher. Although all the owners read the conditions of the study and

agreed to follow instructions, training in the home environment may have been perceived as less formal, lessening the requirement for accuracy during the process (Appendix A).

The following two examples show how negative reinforcement was applied unintentionally. During training some head tosses were prevented by owners who applied negative reinforcement to keep the horse's head facing forward. Two owners were asked to remove this pressure but to still guide the direction of the head with the lead rope. These instructions may have been too vague. Two owners applied pressure on the lead rope when their horses' progress seemed slow or the horses displayed unwanted behaviours. This strong head holding by the two owners may have negatively reinforced head tossing and standing. The use of the target was intended to guide the horse but with traditional training the lead rope is used to pull the horse. The horses were on lead ropes for safety and because ultimately the owners still needed to load the horse in open spaces. It was also part of the generalization process to include the lead rope – the horses needed to lead properly under a variety of conditions. The fact that the horses were not loose, however, may have prevented the owners from seeing the function of the target as a tool to guide the horse. If the horse had been free, and following the target, any head turns would likely result in a change of direction away from the float. Both owners were asked to loosen their grip on the lead rope. The unwanted behaviours ceased immediately, supporting Waran's (2005) findings that many behaviour issues are due to poor handling and training. Julie was reminded to use only positive reinforcement with Tina, and was given verbal praise during and after each successful trial. This verbal praise included describing what steps she had performed correctly (Keller, 1987). Feedback appeared to increase her accuracy, however the horse was eventually withdrawn from the study as stated earlier. Sappy's owner Lynn, was holding the lead rope close to his head and may have been preventing the donkey from following the target independently.

She was also walking in front of the donkey and pulling on the lead rope. Sappy's halter was readjusted as he was also head shaking and it appeared that the halter was too tight. Although an intervention may decrease behaviours such as head shaking, physical reasons for inappropriate behaviours should be investigated as part of the assessment process (J. O. Cooper et al., 2007; Waran).

Training Procedures – Problems, Features and Alterations

The horses all responded to the cue to target, and loaded with no use of pressure on the lead ropes, and no addition of aversive stimuli. All of the horses showed a reduction in baseline level behaviours. Any inappropriate behaviour was ignored and no increase in pressure was applied. The four animals with a history of increasing pressure (Jake, Tina, Peanuts, and Sappy) appeared to respond rapidly initially and both Sappy and Jake reached initial loading criteria within four and five sessions respectively. It would appear that Tina's progress was disrupted by her two trips out during the training. Breaks in training of up to 11 days due to owners going away caused no decrease in loading behaviours for Tina, Joe, Sappy and Marley.

As discussed earlier some procedures were adjusted to suit individual horses' needs. For example Joe was given a reinforcer for each backing step to slow down his response. Basic target training immediately before the loading sessions appeared to help increase loading behaviour for Peanuts and Tina. Reid and Green suggest that certain stimuli might act as signals for 'enjoyable events' (2005, p. 80). In the case of Tina and Peanuts the target may have signaled an opportunity to earn reinforcement. The target may also alter antecedent events, acting as an establishing operation (EO) for opportunities to access positive reinforcement (J. O. Cooper et al., 2007).

Peanuts did not respond appropriately to the cue of a tug on the lead rope and stopped to eat food dropped during the previous trials. Dropped food was swept away in between trials and target training was added to the pre-loading procedure. Her owners were asked to practice leading her with the target outside of the loading sessions. Ferguson and Rosales-Ruiz suggested that float loading issues may be explained as leading difficulties which may have been a contributing factor for Peanuts (2001). Session fatigue may explain the reduction in her loading behaviour to Step 8 in Session 14 (McCall, Salters, & Simpson, 1993). Session 13 and 14 were conducted on the same day.

Data failed to capture the intensity of Jake's backing behaviour and his baseline loading steps results are misleading, suggesting that loading behaviours were increasing across baseline. Although he did load with all four feet in the float on the third baseline session, standing behaviour increased and backing was rapid and potentially dangerous. This shows the importance of recording accurate baseline behaviours and establishing stable responding before training, as stated earlier (J. O. Cooper et al., 2007). Sessions 4 and 5 were conducted on the same day which may account for the increase in inappropriate behavours in Session 5. Sessions 6, 7 and 8 were also on the same day and a neighbour nearby was using a chainsaw. The reduction in inappropriate behaviours in Session 7 may be explained through the process of habituation to the noise (McGreevy, 2007). The increase in inappropriate backing in Session 8 may be explained through session fatigue (McCall et al., 1993). Several sessions a day may have disrupted Peanuts progress, but the results suggest that this did not affect Jake and Guppy who were trained over a week. The terminal criteria for loading excluded unwanted behaviours as it was hypothesized that the horses may continue to display certain behaviours such as pausing (stand) or turning the head (head toss) as they loaded into the float.

Generalization

The current study wanted to use an ethical, safe technique that might generalize to other training problems and potentially improve the welfare of horses during training. Generalization is a defining characteristic of ABA interventions and provides practitioners and caregivers with evidence that the behaviour change transfers to the natural environment (Stokes & Baer, 1977). This intervention was designed to increase loading behaviours in eight horses, using a within-subject design. Measuring the number of loading behaviours before implementing the intervention enabled comparisons to be made between this data and the measures during training and at follow-up sessions to evaluate maintenance of appropriate loading behaviours (J. O. Cooper et al., 2007). The effectiveness of the intervention was visually demonstrated to both owners and other trainers. This intervention differed from previous research because the owners were trained to incorporate positive reinforcement and target training to train their own horses. In light of current concerns about owner knowledge and training welfare this was an important difference (Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy, 2008). Generalization was embedded into the procedures in an attempt to increase the owners' skills in implementation, as well as to encourage generalization of this training procedure to other areas (Severtson & Carr, 2012; Stokes & Baer, 1977).

All participants were asked about the training process once the training began. They were informed by the researcher that they now had the foundation knowledge to be able to train other horses and animals and that the skill was in generalizing this knowledge to other training situations. The researcher emailed after almost every sessions to follow up with written feedback and provide written reinforcement for the successful completion of each session.

The training procedures for both horse and owner was based on behaviour-analytic procedures and principles (Parsons et al., 2012). The owners of the horses were encouraged to share their experience and to generalize this to other areas of training and horse management. It was anticipated that training the owners may enable the results to be more accessible to other owners (Birke, 2007; Visser & Van Wijk-Jansen, 2012). Owners demonstrated generalization during the training process. Julie demonstrated stimulus generalization by reinforcing Joe for appropriate behaviours when she started riding him. Lynn wanted to train her donkeys to touch the target while standing tied up, demonstrating stimulus generalization (Stokes & Baer, 1977).

Distractions were embedded into the intervention by training in the home environment with everyday activities taking place during training. These additional features of generalization in this study included varying times of day for loading and having other people and horses and animals moving around outside the float. This was designed to imitate the natural environment where loading horses make take place at busy shows or at car parks at various riding locations. Owners were encouraged to wear different types of clothing such as large jackets and hats and to load horses in appropriate horse gear such as rugs and different halters (Stokes & Baer, 1977). The follow-up data suggest that these features helped to maintain appropriate loading behaviour for Gussie, Joe, Marley and Sappy. Gussie was also loaded by a different handler in one follow-up session conducted by her owner.

Social Validity

Social validity is a key component of Applied Behaviour Analysis and indicates the perceived value of the intervention, procedures and outcome to those involved both directly and indirectly with the intervention (J. O. Cooper et al., 2007). In order to encourage the use of less aversive methods and to consider the equine-centred approach to training, this study trained the owners to use behaviour-analytic techniques (Waran, 2005). Changes in owners' behaviour were noted anecdotally. These included owners increasing the rate of verbal praise to their horses and, offering suggestions based on behaviour-analytic techniques to improve their horses' responses. For example, one owner suggested adjusting the float and doing a session without the partition so the horse could have easier access to the float. This suggests she understood how to break the task down into smaller steps making it easier for the horse.

Previous studies had sought owners' opinions directly about the procedures used and the results achieved but the owners were not involved in the actual process. Unlike previous studies, this project attempted to consider social validity in terms of the behaviour of the participants, as recorded by them during and after the intervention. Emails sent from owners were collected during the training and a brief questionnaire at the end of the training asked them to consider their values and beliefs about horse training (Appendix J, K, L and M). The questionnaire asked the owners to record four beliefs they held about horse training as part of this social validity assessment (Visser & Van Wijk-Jansen, 2012). This was done because it encouraged the owners to think about their personal ideas and it was anticipated that it might aid in extending future research with these participants by acknowledging and valuing their involvement and opinions (Birke, 2007; Parsons et al., 2012). Although it was not a behavioural measure, it was considered an easy way to direct owners towards considering the behavioural component of the

study – their behaviour (ARCS). The behavioural question asked owners to record how they demonstrate their values and beliefs in terms of what they do when they are training horses. Rather than recording explicit opinions about the process, the owners' answers suggest implicit acceptance of the process. For example of the five owners, four stated that they had shared the information with others. The other owner was aged 10 and her mother Mary replied on her behalf. Mary and her friend who assisted during the training, asked the researcher about using the clicker with other horses and then began conditioning one of their other horses. Lynn told the breeders of her donkeys about the process and sent the researcher's details to them. She wanted to continue with the training so she could train the donkeys to do tricks. She takes them to rest homes and other events so people can interact with the donkeys and told the researcher she felt the training gave the donkeys something to do. This suggests she has an awareness of the need for the donkeys to control aspects of their environment (Brando, 2012). Julie trained one of her young horses to target and then to float load during the study. This horse had no previous float loading experience. She also used the clicker and target with Joe when he was backed for the first time and posted pictures on Facebook showing the target. Two owners completed the questionnaire. The other two owners emailed a detailed account of their thoughts about the training and their experiences using it and how they had shared it with others. Full details of their responses are in the appendix (Appendix J to N).

Visser and Van Wijk-Jansen (2012) refer to two types of knowledge in their research - conceptual knowledge and procedural knowledge. It was the intention of the researcher that the participants would demonstrate procedural knowledge as they applied the techniques to train their horses. The above examples while anecdotal and with no accurate measures – do suggest

that the behaviour of the participants' changed as a result of learning how to apply a new technique, and they shared this information with other owners.

The feedback from owners indicates that the time required to train their horses was acceptable, and the procedure was efficient. Overall the number of float loading sessions varied from between 8 and 23 sessions to achieve successful loading criteria. It is difficult to determine the exact reason for this as both horses trained in the shortest timeframe had clicker experience. Jake and Guppy were trained within four days, with two sessions per day for two consecutive days. Peanuts also experienced two sessions in one day over two weeks, she reached initial loading criterion within 12 sessions. Joe took the longest to reach terminal criteria but he was naive to the float and the initial difficulty he had backing off the float may have slowed his progress. Marley and Sappy took 10 and 13 loading sessions respectively to reach terminal criteria with up to two sessions in one day spread over 16 days. Both Tina and Joe, and the donkeys had sustained breaks in training of 10 and 5 days respectively. Data indicate these breaks in training did not affect the horses' and donkeys' progress. Studies have suggested that training sessions spaced out over time are more effective when using aversive techniques (McCall et al., 1993). The above results suggest the same may apply to positive reinforcement.

Limitations

There were several limitations that need to be considered when interpreting the results of this project. Most of these limitations are due to one researcher conducting an individualized training session for each owner. A multiple baseline design was considered unacceptable for these horses so the decision was made to use three baseline sessions only. It was essential to keep owners actively involved in the process, and one owner did not approve of repeating the procedure. Although stable responding was not adequately established for all horses, enough visual data and

indirect observations were gathered to show the inappropriate behaviours prevented loading, warranting an intervention. Baseline results for Jake are misleading suggesting that appropriate loading behaviours were increasing. He did load with all four feet in the float on the third baseline session, but inappropriate standing increased. Jake's owner reported that this increase in standing followed by rapid backing was normal behaviour after any initial loading practice. She stated that Jake would go in the float further and further, but then run backwards. A longer baseline would have allowed this behaviour to be confirmed, however as stated earlier this was inconvenient for Janine who was training Jake for the purposes of this study.

Using four different floats required four different task analysis procedures. The variations in float design also meant that some aspects, such as the addition of the centre bar, had to be altered as training progressed. The video training footage was based on loading a horse in an angle float so was not completely relevant to four of the five owners. There were some key difficulties in the preparation of materials, defining behaviours, collecting data and conducting the training procedure due mainly to the fact that the researcher was carrying out the research alone. The intention was for the process to benefit the owner and horse. A relaxed, individually tailored session established a safe learning environment where the owner could learn, make mistakes and discuss them without being observed by others (Parsons et al., 2012). Data collection and training with only one person, however, proved challenging and difficulties were encountered both before and during the training sessions. These included video equipment not being turned on, owners not following directions, and equipment not being placed correctly. The additional support of an assistant may have allowed for these errors to be avoided. An assistant may have helped establish a more formal approach to the study by having equipment set up, giving pre-session instructions and checking procedural integrity.

The definition of inappropriate behaviours was based on the behavioural descriptions in Slater and Dymond's study (2011). These definitions became problematic when calculating interobserver agreement (IOA). Although IOA was above 80% for training it varied from 70 to 97% in baseline due to the difficulties in determining stand and head tosses. The observer has some equine experience and is aware of the subtleties in movement when a horse adjusts their physical weight in preparation to move forward or backward, or to remain still. She suggested noting the intent of the horse to move on to, or off the float when measuring the inappropriate stand behaviour. This was not considered an accurate behavioural description and it was decided to allow the hind legs to move one step back in order to displace weight evenly. Head toss definitions may have been clarified by consulting with other colleagues, and measuring the duration of the stand may have been a more accurate way to define a stand.

The analysis of the behaviours during baseline and training was adapted to accommodate the use of the clicker to mark the end of the behaviour. For example head turns towards owners during training did not count as it was accepted that the horse was looking for reinforcement and there was no intention of coming off the float. Rebalancing of hind feet on the float were not counted as back-ups as stated above, even though a hoof may have moved back. This movement was considered a physical adjustment rather than an attempt to back off the float. During training sessions any inappropriate behaviours emitted before the click were recorded, but stands were not recorded unless the owner repeated the word target. According to Slater and Dymond's criteria the horse had 10 seconds to respond to the cue, and may stand still during this time (2011).

Relying on the support of non ABA people to assist with tasks during the study affected the correct application of some procedures. Mary assisted with the training procedure and training

of her 10 year old daughter. Mary's friend assisted with filming and the generalization training of Peanuts but frequently added in extra steps for example fastening the back chain too early in Session 17.

The Strengths

There were several aspects to this study that strengthened it in terms of procedures and generalization of the results. The ABA design and visual data indicated a functional relationship between the independent and dependent variable, and showed that behaviour was maintained over time once training was completed (J. O. Cooper et al., 2007). The training was individualized for each horse and owner, and generalization and maintenance were embedded into the intervention allowing for greater social and external validity (J. O. Cooper et al.). The procedures included training the owner using a BST protocol and the ARCS model, during private coaching sessions (Keller, 1987; Parsons et al., 2012). In contrast to previous studies the number of horses was increased to seven and included one naive horse and two miniature donkeys, providing evidence of effectiveness for a variety of equines. Although Hendriksen trained 12 horses, their study was not a typical ABA design, therefore all horses did not receive the same treatment (2011).

Another strength to the study is the instructional experience of the researcher. The researcher is a qualified teacher with lecturing and presentation experience. She also has relevant equine experience and has instructed at Pony Club level and was able to identify likely barriers to conducting a successful intervention with horse owners. Having relevant experience training horses with positive reinforcement also meant that potential pitfalls could be avoided such as horses pushing owners for food during the pairing process. Relevant generalization elements were added after speaking to other owners about loading difficulties, and drawing on personal

experience with loading horses. These elements included likely distractions encountered in the applied setting, and changing loading distances during training. Other studies had included generalization to different handlers and floats, but have not mentioned distractions (Ferguson & Rosales-Ruiz, 2001; Slater & Dymond, 2011).

Another notable strength is the research was conducted in New Zealand in the natural environment. By carrying out the training in an applied setting - the paddock or private yard with a variety of owners and equines, the results may be more relevant and accessible to horse owners in New Zealand. It may also increase the use of positive reinforcement within the wider equine community (McCall, 1990). Although positive reinforcement may not be widely applied, this may be due to lack of access to skilled trainers rather than any other reason (Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy, 2008).

Unlike previous studies this study trained seven equines in four different locations, with four different floats. One of the main aims of the study was to provide information to a wider group of owners as there is a need to increase the accuracy of knowledge relating to training welfare, and to substantiate the use of ethical training methods to horse owners (Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy, 2008). The owners varied in their experience and type of participation within the equine field. Owners included one Pony Club member, recreational owners and one professional judge and breeder. This may enable the information to be disseminated to a wider group of owners than if only one group had been targeted for training. Although not behavioural in itself, the philosophy question may impact on the ongoing behaviour of the owners (Keller, 1987). The owners had already demonstrated behavioural change by completing the training, generalizing their skills to other training situations or with other horses and, by talking to other people about the process. Studies have shown that not only

do owners rely on fellow owners for information but the cultural traditions surrounding horse ownership and training may affect the ability of outsiders to provide relevant and ethical training information (Birke, 2007; Farmer-Dougan & Dougan, 1999; van Weeren, 2008; Visser & Van Wijk-Jansen, 2012). The feedback via emails and the questionnaire suggest that the owners were happy with the training results and were comfortable talking to the researcher about the process and their experience. Their comments also indicate that ABA methodology was acceptable and may allow the research scientist to communicate effectively with owners during the training process (Farmer-Dougan & Dougan).

Future Research

This study highlighted the importance of training horses to load and stand independently while the owner fastened back bars or locked doors. The results indicate that although behaviours reduced significantly, some horses continued to show less severe forms of the same behaviours during and after training. As the baseline data show, the two behaviours that impeded loading progress were inappropriate backing and standing behaviour. Both these behaviours may have been affected by owner behaviour more so than other inappropriate behaviours. This is because backing and standing may have been negatively reinforced by owners pulling on the lead rope. Certain preliminary training steps might help to eliminate or reduce inappropriate behaviours, especially for horses with potentially dangerous loading behaviours (Shanahan, 2003). Future research therefore could investigate additional preliminary training, and record and measure owner behaviour. Preliminary training might include training horses to back and stand using the target, before starting float loading training. Both Pohjola and Shanahan suggested that pre-training certain behaviours may benefit problem loaders (2011).

Owner behaviour was an important part of this study but was not monitored and measured. In future studies, measures could be taken for both horses' behaviour and owners' use of either appropriate or inappropriate techniques during baseline. During and after training, accuracy of the application of the techniques could be measured using behavioural measures (Parsons et al., 2012).

Loading criteria was set at standing for 10 seconds in the float. All the horses except Tina reached this criteria in an average of 13 loading sessions. This criteria failed to account for closing the door and physically confining the horse (Shanahan, 2003). Doing up the back bar and closing the door are also part of loading. Peanuts' results show that the terminal criteria was not sufficient to ensure successful loading. Peanuts backed out under the back bar when an attempt was made to close the door of the float. Like previous studies, this study shows the foundation training required for retraining or training loading but omits several key components that may affect future loading behaviour. Future studies could include a full task analysis of the process of loading, transporting, and unloading horses to give a more accurate assessment of the complete process.

After the training session some horses were difficult to lead back to the paddocks. This supports the findings of Ferguson and Rosales-Ruiz who suggested that the owner may become a conditioned reinforcer, associated with reinforcement and pleasurable activities (2001, p. 423). This makes it more likely that the horse will want to associate with the owner and not be put away in the paddock (Karrasch et al., 2000). Owners were advised to use the target to lead the animal away from the float and to leave the horse with some food in the paddock. Butler, Sargisson and Elliffe (2011) included instructions to owners to reinforce dogs outside of training sessions for calm behaviour and other behaviours they desired during the training sessions.

Future research could explore including similar instructions to horse owners. This may enable a strong reinforcement history to be established more quickly and may help generalize the target and clicker to other training situations (Stokes & Baer, 1977).

Conclusion

For many horse owners, regardless of the activity they are involved in, loading their horses on to trucks or into floats can be problematic. This very common procedure can become stressful and dangerous if the horse is not compliant (Ferguson & Rosales-Ruiz, 2001; Hendriksen et al., 2011; Slater & Dymond, 2011). The use of traditional methods that rely on negative reinforcement may compound the issue leading to welfare and safety concerns for horse and owner (Goodwin et al., 2009; Waran, 2005). Inexperienced trainers may misapply an aversive or be unable to sustain it for long enough during dangerous behaviours (McGreevy & McLean, 2009). Furthermore an owner may inadvertently reinforce escape behaviours due to the horse's size, by allowing the horse to run backwards or pull sideways during loading (McGreevy & McLean). The more a horse avoids loading, the more likely that welfare will be compromised by increasing an aversive (Brando, 2012). Finally, if training and handling are ineffective, various inappropriate behaviours may continue to occur and the horse may become dangerous (Waran et al., 2007).

A systematic way of training based on general principles of behaviour may enable owners to avoid the pitfalls associated with aversive techniques, and reduce welfare concerns (Brando, 2012). Traditional horse training is based on the principle of negative reinforcement, commonly referred to within the equine community as pressure release (Waran et al., 2007). The horse is trained to emit the correct behaviour when an aversive stimulus is applied that results in the aversive being removed (McGreevy & McLean, 2007). Positive reinforcement entails the horse

receiving some form of reinforcer following the performance of a desired behaviour (J. O. Cooper et al., 2007) . Research has shown that positive reinforcement used with a secondary reinforcer is effective in rehabilitating horses and reducing inappropriate behaviours (Ferguson & Rosales-Ruiz; Innes & McBride; Slater & Dymond). Findings have shown that positive reinforcement for appropriate loading behaviours affects future responding under similar conditions (Ferguson & Rosales-Ruiz). This history of reinforcement may make loading on subsequent occasions more likely (J. O. Cooper et al.; Ferguson & Rosales-Ruiz).

Several authors have suggested that improving equestrians' knowledge of training techniques and the underlying principles of behaviour may also improve equine welfare (Goodwin et al., 2009; McGreevy, 2007; Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy, 2008). The aim of this study was to demonstrate an ethical training process for loading horses that was safe for both horse and owner, was easy to learn and administer, and would generalize across environments. It was anticipated that positive reinforcement might reduce training welfare concerns and be more useful in reducing challenging behaviours during loading (Brando, 2012). The chosen format was to systematically train the owners to use behavioural-analytic techniques to train their own horses to load on to a float. The process of shaping loading behaviours using positive reinforcement increased loading behaviours in all horses and reduced inappropriate behaviours with no direct intervention.

The study results also suggest that it may be possible to achieve the larger goal of disseminating knowledge to other equestrians over time. All owners were able to train their own horses to load in 15 seconds or less and to stand for 10 seconds. Four owners generalized the training to other horses they owned. The fifth owner reported that she gave a brief demonstration of the loading steps at a club event (Appendix M). All owners indicated both

verbally and in writing that they had spoken with other equestrians about their horse's training and their achievements. One owner contacted the researcher about a speaking opportunity. The equine related organization this owner belongs to had shown an interest in the training procedure and asked if the researcher would give a presentation at their annual conference.

This study contributes to the small body of research showing the effective application of positive reinforcement and a secondary reinforcer, with horses. It extends previous research by training the owners to apply the training procedure, increasing their knowledge of training methods and concepts (Visser & Van Wijk-Jansen, 2012; Warren-Smith & McGreevy, 2008). The results of this study show owners can be taught to train their horses in a relatively timely and cost effective manner to use behaviour-analytic techniques, without using an aversive stimulus. This training procedure may also help to improve horse welfare, increase positive interaction between horse and owner, and improve owner safety when loading horses (Ferguson & Rosales-Ruiz, 2001; Hendriksen et al., 2011; Slater & Dymond, 2011).

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Appendices

Appendix A - Float Loading Study Information

Kate Southcombe (B.Ed Hons, Post Grad Applied Science)

As part of my Masters in Science (Applied Behaviour Analysis) I am conducting research into float loading using target training and behavioral principles. The study involves training owners to train their horses with existing problems associated with float and truck loading.

At this stage the guidelines are, the study involves regular training sessions that will be about 15 minutes in duration and entail following a set procedure. The exact length of the study is dependent on individual horses, however all data needs to be completed by the end of June 2014. The study is applied in nature but scientific in procedure and requires owners to follow a set training procedure under the guidance of the researcher and the occasional assistance of a colleague. In order to maintain external validity (and be acknowledged as a scientific study of significance) the procedures require that only positive reinforcement is used during the training process. Positive reinforcement will entail the addition of a desired food item for the horse immediately following the appropriate behaviour.

As a result of participating in this study it is anticipated that the horse will reliably load onto the float when the appropriate procedure is followed. The intention of the study at this stage is to enable owners to retrain their horses using ethical and sustainable training methods that are evidence-based and supported by general principles of behaviour.

For further details pleased contact Kate Southcombe –

kate@eprtraining.co.nz

09 423 7531

021 079 5477

Please note the following;

While there is no training fee, a small charge will be required for equipment that should be no more than $30.

Participants will also be asked to supply the food to be used in the training process – this will be a preferred food that will be assessed with support from the researcher.

Positive reinforcement is often misinterpreted as ‘being nice’ to the horse; positive reinforcement is NOT indiscriminate feeding but part of a structured training programme. All participants in the study will receive full training in the appropriate application of this principle.

Appendix B – Float Loading Questions Sent To Participants

Float loading

The following questions will help me to organize the sessions and gain valuable information for the study. Obviously until we have met and I have assessed your horse no final decisions on who will participate can be made. Thank you for your time and please contact me if you are unsure of any of the questions.

- How many horses do you have available for use in the study?
- Location of horse or horses during study – please list physical address and describe the arrangements such as boarding, at home, at pony club.
- Do you have a float available for use during the study?
- Are you able to commit to undertaking the training required for this study?
- The time commitment for each individual session will be short approximately 15 minutes, but may entail regular daily sessions that will be conducted in afternoons at this stage.
- This training involves a scientific approach that you may not be familiar with. It is important that the procedures are understood and not confused with any other techniques. If you have any concerns are you willing to ask questions to ensure the correct approach is followed?
- Please describe your horse in terms of size, age and gender.
- Please describe in as much descriptive detail as possible the behaviours that your horse displays during loading. For example – my horse rears, or my horse stands still and then backs up as we approach the float

Thank you for taking the time to complete this form.

Appendix C – Details of Baseline Procedure Sent To Participants

Assessment/baseline

This will be an informal initial assessment, followed by a baseline if appropriate.

The procedure will involve you simply loading or attempting to load your horse as you normally would do with no extra help or additional input such as the use of whips or lead ropes to hit the horse.

I will observe and record the procedure in order to be able to define current behaviours and measure the time taken. I will record the procedure using an iPhone.

You will be asked to begin loading from approximately 10 metres from the entrance of the float so that all horses in the study are loading from the same distance. The duration of the procedure is also important as the intended result is you can load your horse within a set timeframe

Procedure

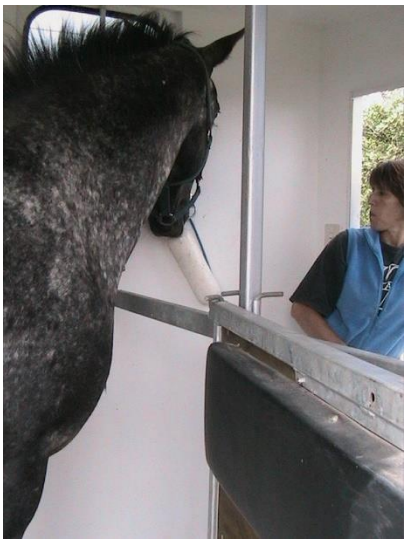
1. Start from the designated spot
2. Attempt loading as you normally would
3. I will record the attempted and or successful loading
4. We will stop for a break and feedback and then return to a baseline if appropriate
5. Termination criteria time will be set at 1 minute. If the horse is not loaded within this time the session will be terminated.

Appendix D – Equipment Used and Pre-Training Procedures

Side bucket and target

Sample of a stationary target in the float

Hand held clicker with wrist strap



Horse touching stationary target

Pre-training

Before working with their own horses each participant viewed the video of a trained horse loading into a float, using target training.

Then they viewed a video of a horse undergoing target training as part of the float loading procedure. This provided the owner with a video model of both the training and the finished result.

Finally they practiced holding the clicker and rehearsed the conditioning or pairing process with the clicker and a large stuffed toy donkey. They also rehearsed holding the clicker and the target and using the target to lead the researcher.

Appendix E – IOA Confidentiality Form

School of Psychology
City Campus
The University of Auckland
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Auckland, New Zealand

OBSERVER CONFIDENTIALITY AGREEMENT

Project Title: Target training as an intervention for horses with float-loading problem behaviour

Researcher: Kate Southcombe
Supervisor: Associate Professor Doug Elliffe
Secondary Observer: Sue Rodriguez-pastor

I agree to be a secondary observer during the behavioural observations for the above research project. I understand that all information acquired during my observations of video footage of training procedures is confidential and must not be disclosed to, or discussed with, anyone other than the researcher and her/his supervisor(s).

Name: _____

Signature: _____

Date: _____

Appendix F – Full Details Provided to Observer

Behaviour definitions

- Head tossing – head turning approximately 45 degrees to the left or right or tossing up or down in succession
- Standing – horse stops walking forward and all four feet remain still – horse won't walk on when prompted. (Baseline prompts will most likely be negative reinforcement, during training prompting will be saying target or owner moving forward.)
- Turning – any leg movement to left or right unprompted by owner
- Backing – any backward movement of legs unprompted by owner

Additional information for observers

During training observations, for the purposes of this study –

- The sound of the click marks the end of the observation of behaviours
- Turning of the head to access feed or to look at the owners is not counted as a heads toss
- In angle loading floats moving sideways is part of the loading procedure – the horse may stop before moving sideways – this is not counted as a stand unless the horse doesn't respond to the owner's physical or verbal prompt to move over
- A horse may adjust a single back leg to stand squarely, this is not counted as a backing behaviour

Terminal loading criteria

This criteria must be across three consecutive trials over two consecutive sessions

- Angle loaders – horse stands for 10 seconds for back bar to be put in place by owner
- Single and double float – horse stands for 10 seconds for back chain or bar to be put in place by owner
- Adapted trailer – donkeys stand in trailer without turning round for 10 seconds after loading

Appendix G – Details of all Procedures

Procedures

1. Conditioning with clicker
2. Target training with target
3. Float loading using target and clicker

Conditioning process

30 trials twice per day for 2 days with at least one day in between

Steps

1. Tie horse using safety knot
2. Stand by the horse's shoulder facing the same direction with food bag on the hip away from the horse.
3. Have clicker in the hand nearest the horse and click
4. Immediately feed horse directly under his nose
5. Repeat this 15 times then change sides and repeat 15 times
6. Break for 10 minutes and repeat (based on standard training procedure and Shawna recommendations)

Termination criteria - horse pricks ears or moves head at sound of click during probe prior to target training, if horse doesn't respond to click the conditioning session will be repeated. If horse bites or puts ears back or demonstrates any unwanted behaviour for three consecutive clicks during training, the session will be terminated for 2 minutes (based on training procedures)

Target training

Maximum of 18 trials per session 2 - 4 hours following on from conditioning – twice per day with at least one day in between training days. Target training will be terminated when horse will go to the target on a verbal cue for three consecutive trials.

Target locations

1. 30 – 60cm under horse's nose
2. 30 – 60 cm in all directions
3. Requiring one step to target
4. Will follow target around

Steps

1. Present target for 10 seconds immediately under the horse's nose saying target
2. When horse touches click and feed and remove target by holding behind your back.
3. Repeat for 3 touches within 10 seconds
4. Ask for target touches within 5 seconds
5. Repeat for 3 touches within 5 seconds
6. Ask for target touches at 30 cm within 10 seconds
7. Repeat for 3 touches within 10 seconds
8. Repeat for 3 touches within 5 seconds

9. Ask for target touches at 60 cm or more so horse has to move one step within 10 seconds
10. Repeat for 3 touches with horse moving within 10 seconds
11. Repeat for 3 touches with horse responding within 5 seconds
12. If horse doesn't respond within the time limit go back to the last successful criteria.

Send to target

1. Stand horse directly in front of stationary target stand by horse's shoulder, holding halter under chin
2. Point at target saying target and gently nudge horse under chin towards target
3. Click and feed when horse touches target - feed horse under the horse's nose (if no response in 10 seconds repeat request, if no response within another 10 seconds prompt horse towards target)
4. Stand horse 2 steps away from target and repeat
5. Stand horse 4 steps away and repeat

Float loading

Each session will have 12 trials, after 3 consecutive trials at 100% move to next criteria. Inappropriate behaviour or no response within 10 seconds will result in target being moved back to last successful criteria.

1. Approach base of ramp following target
2. One foot on ramp
3. Two feet on ramp
4. Three feet on ramp
5. Four feet on ramp
6. One foot in float
7. Two feet in float
8. Three feet in float
9. Four feet in float
10. Stand for 10 seconds

(There are variations with these steps as two floats have no ramp and two horses are loading into an angle float so will have to move sideways after step 9)

Advanced target training - Target hold

1. Stand horse by target ask for touch and count 2 seconds before clicking
2. Increase in 1 second increments to a maximum of 10 seconds
3. Move to next increment after 3 consecutive correct responses
4. If horse moves feet away from target, go back to last successful criteria

Appendix H – Information Sent to Participants after Training

Generalization and maintenance of training

Weekly loading sessions that involve the following different conditions will help to maintain the loading behaviour.

Try to gradually increase the difficulty of the conditions as the horse loads more consistently under one condition

- Loading at different times of day
- Moving the float to different locations at home
- Have a different person load the horse
- Load the horse with other people or horses moving around them
- Load the horse and do a short drive at home – unload
- Load the horse and do a short drive at home – unload, then reload the horse and then unload.

In order to maintain the behaviour it is recommend that reinforcement be given for each successful load.

If the behaviour breaks down at any stage – consider the following

- Health of the horse
- Setting the horse up to be successful – time and location
- Go back to the step that the horse reliably completes
- Reintroduce the target if necessary
- Change the reinforcer – horses can get satiated on one food
- Consider outside factors such as environmental conditions

Links to PDF files supplied to owners.

http://www.eprtraining.co.nz/epr/documents/index_actionguidecode0543672.html

http://www.eprtraining.co.nz/epr/documents/index_actionguidecode05698231.html

Additional Float Loading file available from - kate@eprtraining.co.nz

Appendix I – Questionnaire on Philosophy and Practice

Thank you for participating in the research into float loading – your time, patience and commitment has been much appreciated – as has your flexibility and sense of humour!

It is anticipated that the results of this study will enable more owners to be exposed to this training method, thereby impacting positively on the welfare of our horses.

Part of my research is considering the personal training philosophies of owners and how they make their decisions about what training method to use and why. I would very much appreciate your response to the following.

- Values associated with training of horses

Please note up to 4 key values that you consider are important to you in relation to the training of your horse/horses. (Example – I believe that it is important to be ….. or to use…… or to have……)

Please explain how your values are demonstrated in practice, in other words explain what you do to demonstrate that value in your training procedures. (Example – Because I believe….I don't use……or I always give my horse…….)

- Positive reinforcement

Have you told anyone about the training you have been doing and if so, what was the response from the person/s you told? Have you explained the process and if so can you sum it up in a sentence or two in your own words?

Many thanks for your assistance.

I will be contacting you again shortly to arrange a brief visit to film a one-off loading session.

In the meantime I look forward to hearing of your ongoing successes! Please don't hesitate to contact me if you have any questions about the training.

Kind regards,

Kate Southcombe

Appendix J - Janine's Answers to the Questionnaire.

Philosophy questionnaire

Part of my research is considering the personal training philosophies of owners and how they make their decisions about what training method to use and why. I would very much appreciate your response to the following.

- Values associated with training of horses

Please note up to 4 key values that you consider are important to you in relation to the training of your horse/horses. (Example – I believe that it is important to be ….. or to use…… or to have……)

I have one core value that everything else hangs of. I ask myself is this method the best for the horse? Will this method harm the horse? Will this method be sickness flu for the horse? And can I attain the results I want with this method?

Please explain how your values are demonstrated in practice, in other words explain what you do to demonstrate that value in your training procedures. (Example – Because I believe….I don't use……or I always give my horse…….)

I never use force when training, I use the horse's natural responses and extend on them, I use the horse's enthusiasm and interest. I find what works for them and think about how I am going to get to my end goal

- Positive reinforcement

Have you told anyone about the training you have been doing and if so, what was the response form the person/s you told? Have you explained the process and if so can you sum it up in a sentence or two in your own words?

I have told many. Sadly most think it sounds long winded and hard work. People want instant results! They think I have the patience of a saint and can't be bothered with that shit. Sadly!

The odd few have even had a go and a little girl has had some very exciting results she can do things on her own with her ponies now. She is very excited by it.

Appendix K - Julie's Answers to the Questionnaire.

Philosophy questionnaire

Part of my research is considering the personal training philosophies of owners and how they make their decisions about what training method to use and why. I would very much appreciate your response to the following.

 Values associated with training of horses

Please note up to 4 key values that you consider are important to you in relation to the training of your horse/horses. (Example – I believe that it is important to be ….. or to use…… or to have……)
1/ Black and white eg No confusion

2/ ethical

3/safe

4/building blocks

Please explain how your values are demonstrated in practice, in other words explain what you do to demonstrate that value in your training procedures. (Example – Because I believe….I don't use……or I always give my horse…….

1. Always keep things consistent and the same. Don't blur the lines or use signals

2/ don't resort to harsh equipment or beat up on the horse for not giving the right response. You have probably not been clear enough is your ask.

3/ safe environment for both horse and rider and not putting either into a situation where either could get hurt as a consequence of training.

4/ use a method that builds on each level and don't proceed until

Each level is accomplished happily

 Positive reinforcement

Have you told anyone about the training you have been doing and if so, what was the response form the person/s you told? Have you explained the process and if so can you sum it up in a sentence or two in your own words?

😁. *Yes and while 99 percent of people are on board and curious and want to know more K…… remains negative about it due to Tina not really responding especially under saddle where she got really nappy and unhappy. K…. treats all the time for no particular reason but I won't let her with Joe as he gets pushy and bitey.*

Appendix L - Personal Communications from Julie

6th May

OMG this is the little star. So far she has been the most outstanding and has never missed a beat or had a hint of a fail at anything. Today I thought I would just take her to the base of the float (bearing in mind she has never had any experience whatsoever with the float.) She's like Tina and very eager. We went to the base 3 times very keenly so I thought I would try two feet. She did not miss a beat. Next time she just kept coming spied the target in the front and made a beeline for it and stood slobbering it with glee. We did it twice more with the same result. Easiest float training I have ever had! Thank you so much. Everyone will most definitely be float trained this way from now on!

7th June

Joe was such a star. We had intended on just leaning on him and next thing K… swung her leg over. As expected he was as cool as a cucumber and so I just used the target and got him to come to me.

Appendix M - Personal Communication from Lynn

Anyway enough of this! I was 'over shadowed' on the clicker training by an old bloke who had 'trained horses for years' to harness and now has mini's. Here he was with Marley, a bum rope and threading it through his halter and pulling at him towards a sheet of tarp. I knew Marley wouldn't do it because we haven't done this sort of work. This coupled with a dove cote above his head and birds flapping, lots of people and yes, it was a disaster. My heart was thumping at my boy being treated like this but I wanted people to see the difference.
So after he had harassed Marley I had the target. I placed his lead rope over his back and lead him anywhere I wanted with him following along happily and rewarding. I didn't put him in a new situation with the tarp because as I explained to people it's all about taking it slow. So I didn't get to even talk about starting at the beginning and conditioning or using target training as fun, however, hubby Jim talked to most of the people there who witnessed me doing all this with Marley and the target while the old coot was still going on about his training. The people Jim talked to now had seen both ways of training and the consensus was, clicker training looked a hell of a lot better than the 'old way' of pull and force!!!! I was asked to talk about clicker training with my boys and Marie didn't set it up so I could do it all properly or give people some things to think about. In some cases the older think they have a proven way, so they can stick at that! I did send through your website link for anyone who was interested.

Appendix N - Personal Communication from Mary

Hi Kate,

I would just like to say that Shaylee & I really enjoyed the work with you & the training method used. And my friend Melissa, although still not 100 percent convinced, only because of human error, not the horses error, certainly saw hitting a horse may have got the same results, but it wasn't because the horse really wanted to, it was because it had to. Which further highlighted: It is definitely an individual case by case situation, as it is with children. Some horses need more stimulation & others are just happy to comply without pushing the boundaries. Equally the same with humans. Your sessions, definitely highlight the need to be open minded & positive. I have always believed 99.9% of the time, a horses poor/negative behaviour or attitude is due to the human influence and most of the time if a horse acts up it is because there is something wrong or it has had poor handling originally, as well as the fact we all have bad days. Just like babies, horses watch, perceive & know your body language & are very quick to pre-empt your reaction, simply for the fact that every action has a re-action. Therefore remaining calm, positive & non-reactive teaches your horse to remain calm & focused. Even with children, your body language has to match what's coming out of your mouth. Yes we can fake it till we make it and in doing so we actually change so slowly with time that we haven't even noticed. In general horses are very forgiving & once you have their trust & respect (which will then last & last), will follow your lead with patience. I myself got back into the saddle after 30 yrs of not riding. Unfortunately, my confidence did not get back in the saddle with me. I employed a woman to teach me natural handling skills, which taught me a lot & re-instated my confidence. It did not however teach me anything about training a horse, although it most likely could have if I pursued, but comparing that with the "clicker" work allows for someone with little or no understanding to work with a horse. Meaning a total greenie could take on the clicker training & have huge successes, compared to the "natural horsemanship" technique, where yes you would get results, but it is hands on and your own fears could determine a slow delayed confirmation of the desired response, thus teaching negative behaviour by mistake. The clicker work allows for you to be behind a fence keeping yourself safe which removes any pre-instilled fears. When we aren't scared our brain works quicker & more clearly. I went into this training method with no pre-conceived ideas. I believe it is a winner, & will hopefully become viral. For some people, I could see it will push your own boundaries & possibly even create problems, because it is so easy to blame the horse. If you go into the training with the attitude & belief your horse is going to play up, it's actually hidden within your body language. We may not see it, because it is so miniscule, but to the horse it is like a sore thumb.

Thank you so much for your time you dedicated to everyone in this study.

Now the winter weather seems to have set it & my job commitments, it is only the weekends where Shaylee will be able to help training our other horse & continue with Pieces. Roll on summer, where we have longer days & can do daily work with our new learned skills. It will be a pleasure to update you with how far we go when the longer days are here again.

Regards, Shaylee and Mary