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Introduction – The Fascination with Horses and Learning

Introduction

Everyone who spends time with horses will from time-to-time become fascinated by their behaviour and learning abilities. One does not have to search for long to find reports of extraordinary learning performance in individual horses; examples range from 'Clever Hans', the horse that appeared to be able to count and read but, even more interestingly, was responding to very subtle cues from human bystanders; to reports of horses being able to open box doors and gates (Figure 1.1), to everyday accounts of circus and sports horses performing precise movements in response to small cues from their trainers or riders (Figure 1.2).

Humans have been fascinated by animal learning for centuries and, since the 1800s, scientists from various fields have investigated the mammalian and avian brain to understand how animals of different species learn and adapt to their environments. The best-studied species are rodents and birds, primarily because these species are easy to study and to keep in a laboratory. Despite the evolutionary differences between these species, remarkable similarities exist in the way they learn. This has resulted in the development of 'learning theory', a set of principles that apply to all animals and explain how animals learn. Learning theory has revolutionised the way humans think about animal training, and learning theories are applied with great success in the training of, for example, dogs, marine and other zoo animals (Figure 1.3). Indeed, it is difficult to find a modern training manual for these animals that does not use learning theory as a basis. Learning theory establishes clear guidelines and training protocols for correct training practices and methods of behaviour modification. It is truly fascinating, easy to relate to and simple to understand. Throughout this book, we will repeatedly refer to 'learning theory' as simply a comprehensive term for 'the ways in which animals learn'.

Similarly, more and more horse-trainers use and teach learning theory and understand the opportunities it can offer trainers in every discipline. Like all other animals, horses learn in predictable and straightforward ways. However, traditional horse-training differs fundamentally from the food-based training methods used for marine mammals, exotic carnivores and most companion animals, because it largely relies on what is termed 'negative (subtraction) reinforcement'. During their early training, horses learn that the correct response results in the reduction of pressure from the bit via the reins when they *stop* or *slow*. Pressure from the rider's legs or spurs is reduced when the horse moves forward. To be effective and humane, the application of pressure must be subtle and its removal immediate once the horse complies. This reliance on pressure and the release of pressure underlines the need to ensure that training programmes are effective and humane. Science can and

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Figure 1.1 'Horses on the run': In 2013, the story about Mariska hit the world press after her owner posted a YouTube video showing how Mariska could open not only her own box door but also make her way to open the doors of the other horses' boxes. (Photo courtesy of Sandy and Don Bonem.)

Figure 1.2 Horses can learn to respond to and differentiate between light tactile cues from their riders, regardless of the type of gear used. (Photo courtesy of Dr. Portland Jones and Sophie Warren.)

Figure 1.3 Modern training manuals for many species are based on learning theory.

should step in to measure, analyse and interpret what we do with and to horses.

Understanding the rules of learning can help horse-trainers work with their horses in a way that maintains the horse's welfare as paramount. Learning theory is not necessarily an ethical theory but it helps us train horses in a way that makes it as easy as possible for the horse to respond and succeed during training. Furthermore, it allows us to avoid behavioural side effects such as fear or aggression, caused by inappropriate training.

Veterinary epidemiologists, whose job it is to describe the spread and impact of disorders, often talk about wastage within a population. This is the percentage of animals or, in the case of working animals, the percentage of potential

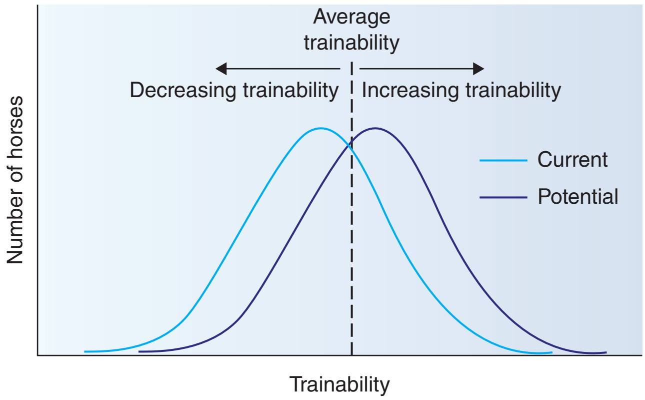

Figure 1.4 Theoretical normal distributions to show how the numbers of horses that cope with training can be increased by using more enlightened approaches. (Reproduced from *Equine Behavior*, copyright Elsevier 2004.)

working days lost through illness or disease. Problem behaviours are the cause of much of this wastage, and in the world of the riding horse it is more significant than many of us would like to imagine (Hothersall and Casey, 2012). A global improvement in application of learning theory, particularly the timing and consistency of pressure and release, could lead to a significant increase in the number of horses considered to be trainable (Figure 1.4).

Horses are being confused on a very regular basis by less-than-ideal handling and become unusable or, worse, dangerous as a result (Hawson *et al*., 2010a). For example, Buckley (2007) reporting on 50 out of 84 Pony Club horses, noted that this focal sub-set of owners reported a total of 251 misbehaviour days during a 12-month period. Importantly, on more than half of these days, this misbehaviour was classified as dangerous enough to cause potential injury to horse and/or rider. Horse-riding is generally considered to be more dangerous than motorcycle riding, skiing, football and rugby (Ball *et al*., 2007). In Australia, horse-related injuries and death exceed those caused by any other non-human species (domestic or otherwise) (AIHW National Injury Surveillance Unit, 2005).

Among non-racehorses, previous studies indicate that up to 66% of euthanasia in horses between 2 and 7 years of age was not because of health disorders (Ödberg and Bouissou, 1999). The implication is that they were culled for behavioural reasons. Clearly, this level of behavioural wastage is unacceptably high. The likelihood is that many such horses are mistrusted or labelled troublesome. With their reputation for being dangerous preceding them, they are met with an escalation of tension in the reins or pressure from the rider's legs, the very forces they have learned to fear and avoid. Difficult horses go from one home to the next and are often forced to trial new ways of escaping pressure and satisfying competing motivations.

The Scientific Approach

Science is sometimes accused of objectifying animals, but the emergence of animal welfare science has already created changes in legislation that have improved animal wellbeing. It has shown us how modern diets may prompt obsessive–compulsive disorders; how weaning can affect social relations among animals; and how the behaviour of a breed can be a product of its shape.

It is the rigour of the scientific approach that ensures that we arrive as closely as possible to the truth about horses. The scientific method sometimes seems tedious because of its insistence in dismantling the elements of the questions piece by piece and its tactic in not setting out to prove a hypothesis but to disprove the null hypothesis (the non-existence of it). It is rather like the legal notion of innocent until proven guilty. Similarly, in science it is empty until proven full. An important tenet in behaviour science is Lloyd Morgan's canon, which dictates that in no case should an animal activity be interpreted in terms of higher psychological processes if it can be reasonably interpreted in terms of processes that stand lower in the scale of psychological evolution and development. Occam's razor (The Law of Parsimony) is a more general maxim that decrees that in making explanations, you should not make more assumptions than the minimum needed, so if a phenomenon can be explained in terms of simple rather than more complex ways, it is more likely to be correct. The more assumptions you have to make, the more unlikely an explanation is. This principle underpins all scientific theory building. It is easy to make rash assumptions about horse behaviour, intent and purpose.

Those with concerns about applying a scientific approach to equitation seem to fear the *construction* of equitation as a science, which is certainly not our intent. Equitation science represents the scientific *study* of equitation; it does not seek to turn equitation into a science. Scientific measuring of variables is important because it allows riding and training techniques to be compared so as to demonstrate what works and what does not. Equitation science will also allow us to measure the welfare consequences of doing the wrong thing. The *physical* interactions between humans and their horses are readily available for study. For welfare reasons, understanding these interactions correctly is crucial because, on the one hand, excessive pressure is often being used to signal to horses and, on the other, we cannot expect horses to know what we require of them without at least some cues.

In all other sports, technologies such as kinematic analysis and pressure-detecting devices have been able to refine human technique. If we accept that horses work best when riders have good technique, we can see that, as sentient beings, they are more deserving of these advances than any piece of sporting apparatus. Like all animals, horses learn most effectively when the training methods are appropriate. Inappropriate training practices can also have a negative impact on a horse's welfare and can lead to conflict behaviours that jeopardise the safety of riders and trainers. Equitation science gives us a way of measuring and interpreting interactions between horses and their riders.

Equitation science has the potential to address a series of important problems. First, it elucidates the role of negative reinforcement and habituation in the learning processes of horses on which we ride and compete. Second, it addresses the need to measure rider interventions that may compromise horse welfare, which will assist the administrating body of equestrian sport, the Fédération Equestre Internationale (FEI), in determining what practices and interventions are acceptable on welfare grounds. For example, devices such as whips and spurs are still used routinely by some trainers. Indeed, at elite levels, spurs and double bridles (which are more severe in their action than regular single bits) are mandatory. Third, and perhaps most important, equitation science will educate current and aspiring riders in how best to apply the core principles of learning theory.

By improving riders' and coaches' basic appreciation of the science that underpins their work, we have been able to engage them in improvements that occupy the cutting edge of equitation. For a scientific horse-training manual, readers are directed to *Academic Horse Training: Equitation Science in Practice* (McLean and McLean, 2008) (www.esi-education.com).

> In some sectors of horse-training, such as the sport of dressage, the cues and signals used to elicit alterations in the mobility and posture of horses are known as 'aids'. This word is antique in origin, derived from the French verb 'aider', meaning 'to help'. The notion that cues in any way offer assistance to horses is anthropocentric and has been abandoned in our text because it nourishes the notion of the 'benevolent' horse, the horse that is a willing partner. Horse-trainers should respectfully recognise that training is an act of equine exploitation rather than equine enlightenment, and modern equitation must take full account of the cognitive processes of the horse.

Figure 1.5 Equitation science is for everyone who spends time with horses and ponies. The training techniques presented in this book apply to all types of horses and all disciplines. Regardless of whether you are an international competition rider, a horse-trainer or a leisure rider, knowing how to use learning theory is the key to all good training and good horse welfare. (Photo courtesy of Dagmar Heller.)

Any system of riding that aligns with learning theory will result in subtle signalling and therefore, by implication and necessity, an independent seat. Our contention is that *stop* responses to the bit and *go* responses to the rider's legs are the foundations that underpin all advanced riding techniques. It would be good to see a return to traditional coaching protocols that required novice riders to learn to balance before picking up the reins. This would avoid them delivering conflicting signals.

This book is essentially an introductory text because there is much still to discover about the way mechanisms of horse-training align with more than a century of studies of learning in laboratory animals. There is also room for considerable caution because there is no laboratory equivalent for the ridden horse – you cannot ride a rat. Without restraining a rat, you cannot easily apply and then release pressure, and the horse probably provides the best model for studies of negative reinforcement. This possibility represents one of the most exciting aspects of equitation science.

The aim of this book is twofold: we partly aim to describe learning theory and give examples of how learning theory can be applied to practical horse-training. We also aim to provide an overview of the current state-of-the-art of scientific studies relating to equitation.

The purpose of this book is not to sell or publicise a particular training method, but to communicate the principles of learning theory and the science of equitation (Figure 1.5). It should be noted that just because a training method can be explained through learning theory does not necessarily mean that it is ethical or safe. Training is essentially an exploitative event and it is always the responsibility of the trainer to prioritise the horse's welfare and safety above any training goal.