Carrots and Sticks

Have you ever wondered how a sheep dog, police horse, leopard or octopus is trained? Drawing on interviews with leading animal trainers, *Carrots and Sticks* offers 50 case studies that explore the step-by-step training of a wide variety of companion, working and exotic animals. It reviews the preparation of animals prior to training and common pitfalls encountered. *Carrots and Sticks* brings behavioural science to life, explaining animal training techniques in the language of learning theory. Opening sections on instinct, rewards, punishers and intelligence are richly infused with examples from current training practice and establish the principles that are explored in the unique case studies. Its accessible style will help reassess your preconceptions and simplify your approach to all animal-training challenges. This exciting text will prove invaluable to anyone with an interest, amateur or professional, in the general basics of training, not just students of psychology, veterinary medicine, agriculture and animal science.

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Carrots and Sticks
Principles of Animal Training

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For Pierre and Margi
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Preface

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

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

None of the forms of work mentioned so far required large changes in the animals’ behaviour. In contrast to these relatively simple uses of animals, in the domains of hunting and herding humans since pre-history have sought to increase their efficiency by investing considerable time in training animals. Training means changing the frequency with which animals show certain behaviours. Unwelcome behaviours become less likely, while desirable ones become more likely. Ancient Egyptians even tamed cheetahs for hunting, and the work that these big cats performed may have been seen as the most sophisticated and effective hunting tool then available. However, this is a very unusual example. More generally, hunting and herding were the domains in which the dog truly came to the fore as the most trainable of all species.

The role of animals in warfare and in the relative success of different human cultures is often underestimated. The cultures that have prevailed from ancient origins are those that most fully exploited a variety of animals in combat, especially horses. Chief among the peoples that owed their success to the horse were the Mongol hordes. These excellent equestrians used their horses as sources of milk and meat when they were not exploiting their fleetness of foot for lightning raids on unmounted victims. The training of horses to perform
specific behaviours useful in warfare eventually gave rise to the emergence of military riding academies. The haute-école dressage movements that the Lippizaner stallions of Vienna now perform in their displays were first developed some 400 years ago to vanquish enemies in face-to-face combat. Training and riding skills contributed to the success of armies and the survival of individuals.

Horses are not the only species to have been conscripted into human conflicts. Dogs and pigeons were used to carry messages during the trench warfare of World War I. In World War II the Russians used carefully selected dogs as antitank operatives, while the US Navy trained dolphins to place explosive devices on the hulls of ships. The same war prompted research into the deployment of pigeons to guide what was intended as the world’s first smart missile. Three pigeons were strapped into position and trained to peck a spot on recognition of approximations to their target, this peck being transmitted to the guidance system of a missile that was actually never used.

This long tradition of involving animals in human conflict still continues. Dolphins were used to search for mines in the second Gulf War, and dogs are used to detect landmines and are trained to search buildings for terrorists with tiny cameras strapped to their foreheads. Explosive detection is becoming ever more sophisticated these days.
In BF Skinner’s Operation Pelican three pigeons at a time were each trained to peck when some designated ‘target’ appeared on the screen (a). They were then inserted into individual compartments in the nose cone of the missile (b). Reproduced courtesy of the B.F. Skinner Foundation.

Fig. 0.2  In BF Skinner’s Operation Pelican three pigeons at a time were each trained to peck when some designated ‘target’ appeared on the screen (a). They were then inserted into individual compartments in the nose cone of the missile (b). Reproduced courtesy of the B.F. Skinner Foundation.

with techniques that concentrate volatile substances from a single site and seal them in small airtight capsules so that these can be sent to the dog for his opinion.

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

Over the very long history of training animals, a variety of expert traditions have developed. The language used to describe them is just as varied. For example, the way a shepherd describes how to train his dog is very different from the accounts that might be given by a falconer or by an elephant trainer of how they train their animals. The ways in which these different animals are trained also appears to differ enormously and in turn seems quite different from the advice given in a booklet on ‘How to train your pet’. However, the basic idea behind Carrots and Sticks is that these differences are superficial ones and that the same general principles apply to any kind of animal training. We reached this conclusion by different routes. One of us (PMcG) trained as a veterinarian and specialised in animal behaviour, with a particular interest in and love of dogs and horses. The other (RAB) trained as a research psychologist, with a particular interest in comparative psychology and learning theory. This book is a result of our collaboration in trying to make clear what we believe these general principles to be.

One set of principles has to do with behaviour that is largely determined by what kind of animal is being trained. We refer to this as instinctive behaviour. Although this is an old-fashioned and ambiguous term, it is better than any other label for denoting behaviour more strongly determined by an animal’s genes - its nature - than by its experience - its nurture. Chapter 1 discusses those aspects of instinctive behaviour that are important from the perspective of an animal trainer, and also the way that instinctive behaviour changes
as a result of experience; hence the title ‘Instincts and their modification’. One of the core principles of training is that based on positive reward: the ‘carrot’. The properties of such learning have been extensively studied by psychologists using various kinds of conditioning methods. This research has led to the principles of importance to animal training that are described in Chapter 2. A related set of principles, described in Chapter 3, have been derived from conditioning studies that have employed aversive events - ‘sticks’ - to find out how punishment works (and sometimes doesn’t work) and how avoidance behaviour is learned. Many attempts at training fail because the trainer assumes that animals have very human-like ways of perceiving and thinking about the world. The limitations of this assumption and the realities of animal intelligence are the main topics in Chapter 4.

You are invited to approach the two parts of the book in different ways. The first part can be read in the conventional way from beginning to end, while the second part has a quite different format. It contains a range of case histories to illustrate how the basic principles have been put into practice by trainers. The cases are intended for browsing in no particular order. Since the overall goal of this book is to take the mystery out of training, in the case studies we have unpicked the various processes by which the animals acquired their sometimes amazing behaviours. The accounts of their training are offered as illustrations of training practices. They are not intended as models for readers to emulate. The performances you see represent the end-points of a long process of behavioural modification that may have begun when the animals were very young. Having considered various approaches, you will be better able to decide for yourself whether it is right or wrong that animals are used in these ways. Are certain behaviours undignified? How can animal welfare be ensured when animals are required to work for a living? Should zoos require their animals to perform? Can this enrich their lives? It is possible that your informed response to these questions may then be at odds, say, with your views on riding horses. Regardless of these dilemmas, the information in this book should add to your fascination with the non-human animals with whom we share the world.

The main theme of this book is that, despite huge diversity in the aims of different kinds of training and in the way that trainers explain their methods, all successful training depends largely on the principles we discuss in the four chapters of Part I.
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