Camel Handling and Training

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Abstract

Camel training has been performed only in some countries and mainly using ancestral methods. There is a huge gap between traditional belief and science in relation to animal training. There is a belief that camels are very aggressive animals, difficult to handle, and needs to be trained using aversive methods. However, camels are used for riding and carriage and like all other animals, can learn and can be trained with appropriate methods, namely using learning theory. A good trainer should have a good knowledge of camel behaviour, be able to read their behaviour and communicate clearly with the camel, adapting himself to different kinds of situations according to each animal's character. Camels have great learning potential, adapting their behaviours quickly according to the environment. In order to train them, spending a large amount of time studying their behaviour, and observing how they interact together and towards humans, the trainer will be able to pull off the best part of each camel and develop a particular bond with each of them. This chapter presents scientific knowledge in animal learning and psychology. Specifically, it focuses on associative and non-associative learning and gives some practical guidance on how to train camels from the ground based on the experience of the main author.

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8.1 Introduction

Camels, like any other animals, can learn and adapt to new situations. Understanding and interpreting the behaviours of the camel is the key to learning from them and later adapting teaching methods. Learning is not necessarily meaning to be trained. Learning is happening every time an action is done. Thorndike (1898a, b) is one of the founders of the learning theory concept, and inventor of the concept of connectionism (models of mental or behavioural phenomena as emergent processes from a network of interconnected single units). Pavlov (1927) is a precursor as well and proposed the concept of classical conditioning. The non-associative and associative learning rules (see Table 8.1 for the most relevant definitions) should be deeply understood by all individuals working with camels, not only to improve the physical and psychological welfare of camels but also to reduce accidents and the number of camels lost to behavioural problems (i.e., aggressivity) caused by an improper relationship with a person. Learning how to handle camels using learning theory will also reduce camel-related human injuries, and the time spent handling and moving camels. This chapter critically reviews the literature to provide a comprehensive, detailed and deeper understanding of how associative and non-associative learning functions when working with camels. This chapter highlights some examples of practical outcomes in training from the ground based on the main author's experience.

8.2 Associative and Non-associative Learning

Training is based on the proper communication between the trainer and the animal; the trainer should send a clear stimulus to avoid misunderstanding and should reward the wanted behaviour (McGreevy and Boakes 2006). Before starting the training programme, the trainer should have a good knowledge of camel behaviour and learning theory, a key factor to establish a good human-camel relationship. Table 8.1 shows the main definition of animal learning.

Animals can learn through associative and non-associative learning (Table 8.1).

In the non-associative, there is only one stimulus, while in the associative learning a relationship between at least two stimuli becomes established. Non-associative learning is divided into two categories: habituation and sensitisation.

Habituation. When a phenomenon happens frequently, animals will react less to this stimulus, becoming habituated to it and reducing or totally eliminating their behavioural response. Example: When a camel living in the desert is moved to a paddock near a road, his reaction when seeing a car or a truck for the first time should be to stop grazing and run away, being afraid of the noise. By the time, if several cars

Table 8.1 Definitions of animal learning

Associative learning	Process that allows the animal to establish the connection between two events in a relationship of reciprocity between them (Vallortigara 2000)
Classical conditioning	Is a type of associative learning whereby behavioural response becomes elicited from a conditioned stimulus (Pavlov 1927). With classical conditioning, animals learn which environmental cues predict future events so that they can behave accordingly (Cooper 1998). In such cases, the animal has no control over events; and the response is not under the control of the animal. Classical conditioning increases the predictability of environmental stimuli (Vallortigara 2000)
Communication	The activity of conveying information through the exchange of thoughts, messages, or feelings, as by vocal and visuals signals, or behaviour. It is the meaningful exchange of information between two or more living creatures (Barnlund 2008)
Continuous reinforcement	Each correct behaviour of the animal is reinforced (Cooper 1998)
Habituation	The animals decrease their response to a single stimulus (McGreevy and Boakes 2006)
Learning	The information obtained from the interaction between an environmental stimulus and the elicited behaviour will form the experience, according to which the animal will change its behaviour in the presence of that stimulus when it will reoccur in the future (Vallortigara 2000). Broadly, animals learn to use the information coming from the environment to change their behaviour in the most advantageous manner to them (Nicol 2005)
Non-associative learning	Refers to a relatively permanent change in the strength of a behavioural response to a single stimulus due to repeated exposure to that stimulus (Vallortigara 2000)
Operant conditioning	Is a type of associative learning in which an individual's voluntary behaviour is modified by its antecedents and consequences (Skinner 1938). It works by giving or taking away rewards or punishments (discomforts) when the horse performs a desired behaviour through the chain: stimulus—response—reinforcement (Cooper 1998). In operant conditioning it is the animal's behaviour that determines the progression of the reinforcement. Therefore, it allows the animal to associate two events over which it has control (Vallortigara 2000)
Primary and secondary reinforcements	Primary reinforcements are any resources that animals have evolved to seek (food, water, sex, play, freedom, companionship), whereas secondary reinforcement are stimuli which are not intrinsically rewarding but that can be associated with primary reinforcement (through classical conditioning) (Mills 1998)
Punishment	Punishment is any action that makes the occurrence of a behaviour less likely to be performed in the future (Mills 1998) • Positive punishment is to add something undesirable or painful • Negative punishment is to remove something desirable by the animals
Reinforcement	Any event that increases the frequency of a certain behaviour and makes it more likely to occur in the future (Vallortigara 2000). The reinforcement needs to be something biologically relevant for the

(continued)

Table 8.1 (continued)

	animal (the removal of discomfort or the appearance of food), so it is highly motivated to obtain it • Negative reinforcement is the subtraction of something aversive (Thorndike 1898a, b) • Positive reinforcement is the addition of something pleasant (Skinner 1938)
Relationship	The emerging bond from a series of interactions that partners have. It is based on past experiences and expectations of the other individual's responses (Hinde 1979)
Sensitisation	Sensitisation is the opposite of habituation. There is an increase in the response after repeated presentations of the stimulus by itself (McGreevy and Boakes 2006)
Stimulus	Any appreciable change in the environment that causes a behavioural response in the animal (Vallortigara 2000)
Training	Training suppresses undesirable behaviour and enhances desirable natural or new behavioural responses by punishing or reinforcing them with the deliberate or accidental application of learning theory (Cooper 1998). The goal of training is to lead the animal to perform a predictable behaviour as a result of the appearance of specific signals (McGreevy and Boakes 2006)

Adapted from Baragli et al. (2015)

Fig. 8.1 Camel wearing quietly different type of halters

and trucks are passing by, the camel will not run away by habituation because it becomes a normal situation, and he will continue to graze near the road. Another example of habituation is when the camel learns to wear equipment, like a halter or a blanket (Fig. 8.1). The first time the halter is placed on the camel's head, the camel will shake the head and will show several stress-related behaviours, but after a while,

he will get habituated and will wear the halter quietly, and even if the halter is removed and put on later, the stress-related behavioural reactions will not be present anymore.

Sensitisation can counteract habituation and can be utilised when a camel has stopped completely to react to a stimulus. It can be used when an animal does not react to any stimulus.

Associative learning is the process whereby things that occur close in time can be associated. In associative learning, the animals make an association between a stimulus and a response. Associative learning is divided into two categories: classical (or Pavlovian) conditioning and operant (or instrumental) conditioning (Table 8.1).

Operant conditioning (OC): OC is the process of learning through reinforcement and punishment. It involves an organism that must first act up on the environment in some way. Thorndike's learning theories came from his study on cats in a puzzle box. In the experiment, one hungry cat was put in a box. On the outside of the box was a fish that the cat could see and smell. The box had a door that could be opened by pressing a lever inside the cage. Sensing the fish, the cat would engage in a variety of behaviours in an attempt to open the door and get the fish. Eventually one of these behaviours (pressing the lever) would result in the door opening and the cat getting the fish. Then, the consequences associated to the behaviour of pressing the lever were freedom and the fish (rewards). Learning for the hungry cat was a matter of making the connection between lever-pressing and door-opening/fish-eating. This learning was incremental, not insightful. This means that the cat was not able to gain sudden insight or make a logical connection between lever-pressing and door-opening/fish-eating. Instead, the cat made small incremental gains towards the lever-open door connection. Each time the cat was put in the puzzle box, it took successively fewer trials to express the right behaviour (pressing the lever). Finally, after many times in the puzzle box, the cat eventually would go directly to the lever. This is called trial and error learning or selecting and connecting. A behaviour was selected (lever-pressing) and a connection was eventually made and strengthened with the door-opening consequence (Johnson 2014).

How to teach an animal to press a lever? Merely by defining a wanted behaviour and rewarding the animal at each time when that behaviour is appearing. At the reverse, by defining an unwanted behaviour and punishing it every time it is appearing. Reinforcement always increases the wanted behaviour; in opposition punishment always decreases the occurrence of unwanted behaviour. There are also two types of reinforcement, positive and negative and two types of punishments, positive and negative (Table 8.1). For rendering a reinforcement or a punishment effective, it should occur immediately after the behaviour to be encouraged or discarded. Indeed, the timing is very important to be taken into account. Different studies on animal learning theory show that a short time between the behaviour and the reinforcement or punishment is more effective than a long time (Gibbon 1977).

Example of training using reinforcement: The trainer wants to teach a camel to move forward using halter pressure (negative reinforcement) in order to lead him for a walk. The camel doesn't know how to react at the first time, so he will try many

solutions, pull backwards, jump, and move forward. As trainer, we know what is the wanted behaviour (moving forward), so the pressure (negative reinforcement) must be realised when the camel moves forward. We can also combine training with negative and positive reinforcement, and in that case, when the camel moves forward the pressure is released (negative reinforcement) and some food is given (positive reinforcement). By operant conditioning, the animal learns that pulling the halter forward means that he must move forward. The camel will be willing to give again a similar behavioural response (moving forward) the next time the halter is pulled forward; the camel will show the wanted behaviour to avoid the pressure and obtain additional food.

Example of training using punishment: when a camel is dangerously moving, the trainer will yell at him in order to decrease the unwanted behaviour. In this case, a stimulus is added (yelling) in order to decrease the behaviour (moving dangerously). In negative punishment, a positive stimulus is removed. As an example, when the camel misbehaves, the trainer doesn't give him food. In this case, the stimulus (the food) is removed until the unexpected behaviour decreases. Negative punishment works only with animals trained with positive reinforcements.

There are many studies on dogs which have proved that training using positive reinforcement is more welfare friendly because it is associated with positive neurotransmitters and emotion, training by punishments on the contrary leads to negative emotions (Gal 2017).

Classical conditioning (CC): CC is referring to the behavioural and physiological changes after experiencing of a predictive relationship between a neutral stimulus and a consequent biologically significant event. It involves an organism that is passive, simply responding to a stimulus presented to it. Pavlov noticed that the presentation of meat powder (an unconditioned stimuli or UCS) to his dog caused its salivation (an unconditioned response or UCR). The original stimuli and response are unconditioned because both occurred naturally without any conditioning. During the conditioning, the meat powder (UCS) was paired with a neutral stimulus (NS). The neutral stimulus was a bell.

Here, "neutral" means that there is no particular response of the dog when the bell is used. A plate of meat is presented to the dog simultaneously with the bell ringing several times. Those simultaneous stimuli produced exactly a similar response (UCR), i.e., salivation. The link between the bell ringing and the meat is providing an important strength. Consequently, the bell ringing will produce a similar response i.e., salivation, which becomes the conditioned response (CR). Thus, the dog is conditioned and can respond to the bell ringing at each time. The bell ringing is provoking by itself a conditioned stimulus (CS) (Johnson 2014). The more a certain event or environment is paired with a particular consequence, the stronger the association.

Example: When the trainer asks the camel to stand up using a particular sound before applying the pressure with the rope, after many repetitions, the camel will stand up only with the voice anticipating the pressure.

Clicker training (Feng et al. 2016) is a method based on behavioural psychology that relies on associative learning, combining classical and operant conditioning. A

clicker is a mechanical device that makes a short and distinct "click" sound which tells the animal exactly when it is doing the right behaviour. This clear form of communication, combined with positive reinforcement, is an effective, safe and humane way to teach any type of animal any behaviour that it is physically and mentally able to do. Before starting the training, the clicker is loaded, which means that the clicker is played, and food is given to the animals. This first phase is based on classical conditioning, the animal learns that the sound of the clicker is associated with food, like the bell and the meat in Pavlov's dog, and the sound of the clicker can be considered a secondary reinforcer (Table 8.1). There are different methods of clicker training, namely free capture, targeting, and combined with negative reinforcement (Feng et al. 2016). In the case of the free capture, in the second phase of the clicker training, the trainer clicks at the moment when the animal shows the wanted behaviour: for instance, when the camel lifts his foot, the trainer clicks simultaneously. When the camel lies down, the trainer clicks. Clicking is like taking a picture of the behaviour that the trainer wants to reinforce. Immediately after "taking the picture," a reward is given to the animal. The reward can be a break time in the exercise, playing for a short moment or a piece of favourite food. Quickly, the animal is associating the behaviour with the click and the reward. The animal becomes more willing to recall this pleasant experience and will repeat the action that made it hear the click and so the reward. In targeting (Fig. 8.2), during the second phase of the clicker training, a target (e.g., a cone or a stick) is used and when the animal touches the target the clicker is played and food is given, then the target is moved and the animal moves and keeps touching the target. This is particularly used for teaching animals to self-load into vehicles (Dai et al. 2019).

An animal who was clicker trained or operantly trained is more willing to learn new behaviour. Even years later, learned behaviours are still remaining because animals were aware of them as they learned them rather than acquired them without awareness. As they have control over the consequences of their actions, they do develop confidence. Because they expect those consequences to be pleasurable, they become more and more enthusiastic about learning sessions. Basically, all behaviour can be reinforced and learned with all animals following these three steps: seeing the behaviour; marking the behaviour; reinforcing the behaviour.

Clicker-trained animals want to perform behaviours for which they have been rewarded in the past.

They will perform any behaviour if they did understand the meaning of the cue and if the desire of the reward is strong. If they do not perform the behaviour, the animal is not necessarily disobeying, so the trainer should think about the following questions:

- Does the animal know the meaning of the cue?
- Does the animal know the meaning of the cue in the environment in which it was first taught, but not in the environment in which it was given?
- Is the reward for doing the behaviour sufficiently desired by the animal?

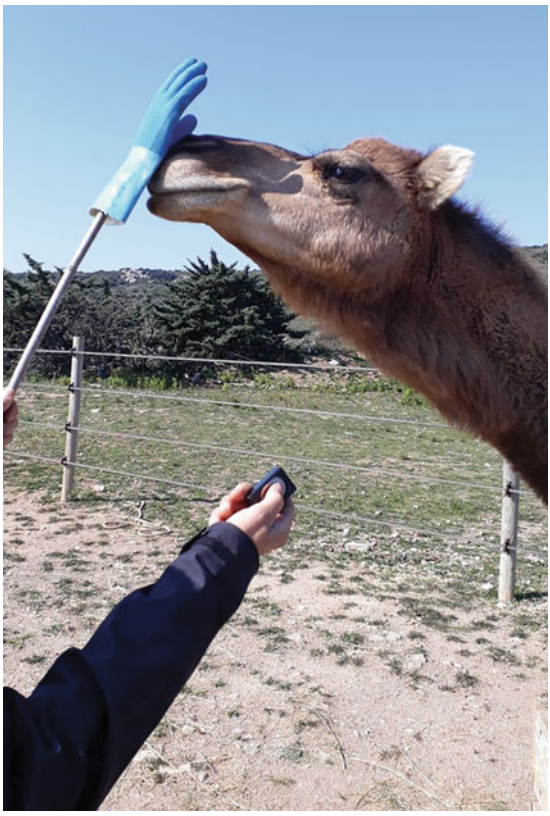

Fig. 8.2 Example of targeting training

According to the answers to those questions, the trainer should revise the training process and make sure the animal knows the meaning of the cue in different environments, regardless of distractions and that the desire for reward is strong enough for the behaviour. Clicker trainers who learn the underlying principles have at their disposal a powerful set of tools that enable them to analyse behaviours, modify existing methods for individual animals and create new methods when none previously existed. This flexibility allows the tools of clicker training to be re-invented in new forms that work in a range of situations, and for an infinite variety of animals. Jim Wiltens, co-leader for the "Camels Over the Himalayas Expedition" has successfully experienced clicker training on camels with Karen Pryor technique of clicker training (Pryor 2009).

Animal learning theory can be applied to camels, individually or at the herd level contributing to the improvement of their management, and consequently to their welfare. To manage camels properly, their high capacities to adapt to new situations should be considered. This is why knowing how a camel is learning is important (Iglesias et al. 2020). Their main motivation is to get food in the easiest way as possible and feeling safe in their environment. Unfortunately, there are no studies on the effects of training based on learning theory in camels, so these types of studies

Fig. 8.3 Carolie holding a dromedary camel with a very soft hand

are needed, and the rest of the chapter is based only on the experience of the main author (Fig. 8.3), who is an experienced trainer of camel in France.

8.3 Camel Training Methods

Nowadays, the main objectives in camel training are linked to the purpose of moving them, and keeping them quiet during procedures. Often it is needed to teach them to enter a specific place like for a lactating female in a milking lane or into a crush for a clinical inspection, or for any type of camels teach them to load into a vehicle for transportation. Similarly, it may be needed to teach them to stay quiet during the milking process, or while they are tethered somewhere, or it is important to teach them how to respond to stimuli to ride them, and other similar activities.

8.3.1 Training Tools and Aids

One controversial element in animal training is visual contact as it has been observed in horse and human interaction. The effect of human eye contact on animals has been studied in both dogs (Wallis et al. 2015) and sheep (Beausoleil et al. 2006) and it has been shown that eye contact from humans to dogs can be perceived by the dog as a threat. In the study of Beausoleil et al. (2006), it has been reported that human eye contact with sheep did not provoke fear but still induced a certain nervosity.

However, with horses, the effect of human eye contact is not well understood (Worth 2016). According to professional horse trainers, there are different points of view regarding the effect of human eye contact with horses. According to some reports, the trainer should use soft eye contact when handling horses; it means a soft look at the horse is possible but a wide field of view must be kept. A soft look means not looking straight in the horse's eyes. Some trainers indicate hard contact is preferred to establish dominance on the horse. Another category of trainers say all kinds of eye contacts should be avoided as it will scare the horse; it would think the trainer is stalking him. Due to these different recommendations, a study was performed (Verrill and McDonnell 2008) to determine if making direct eye contact or not making it really influenced reactions from new horses when being first-time catch in a pasture. No difference was shown in the study. Many of the horses used in this study were semi-wild ponies and catching them in the pasture was not easier or harder regardless of eye contact. Some of the horses could be caught and others could not be, eye contact had no effect. Thus, eye contact may not be an important factor in human-horse interaction. Probably, similar conclusions could be done for human-camel interactions, which are similar to human-horse interactions.

The material of training tools is essential when working with camels. All tools must be strong enough to resist camel strength. From the head collar to the saddle, it mustn't hurt the camel. It is impossible to train any animal if it is physically painful for him to be around human. A rope halter adjusted to a camel head may have more beneficial effects, once training is started, rather than a nose peg, or nose ring which can often cut nostrils if there is too much tension on it. Lead rope, physical link between the camel and his handler, should be selected to be light but strong. Camel head being horizontally oriented, weight from the lead rope can quickly create discomfort on camel head. Saddle should consider vertebral bones from the camel but also the hump. Shoulders and hips should be free from their actions too. No hot spots should appear on camel skin after the saddle is taken down. A stick, which is the prolongation from the hand, can be used to help the handler to stay safe at a good distance from the camel.

8.3.2 Safety of Handlers/Trainers

As camels are massive animals, it is preferable to stay safe around them and use some security placement while working around them. Camels have very flexible leg attachments on their body, so they can kick in a very large range around their back

Fig. 8.4 Two handlers during a handling demonstration

legs. Front legs are used in many assaults and can cause strong damage to handler's body. Camels have sharp teeth, and all handlers should always consider it while working with them. In a general manner, camels use to push themselves in the herd, the leader making his own way to the best resource (food, water...). Being a natural behaviour but dangerous for a human, nobody should stand close to camel's shoulders or right in front of them. Also, working with closed-wall enclosures can be dangerous, and the feasibility to be smashed against the wall is high. The open-walled enclosure allows escaping for the handler. It is very important to never in any way lie down around a camel. It's also recommended to have at least two handlers when starting camel training (Fig. 8.4).

8.3.3 Round Pen Training

Round pen training is largely used in horses and the role of ethology in this type of training has been reviewed by Henshall and McGreevy (2014) and should be taken into account also for camels. Approaching a free-roaming camel in a large area can be tricky, consequently round pen training can be a good method to first approach a camel and establish a human-camel relationship. Whatever the training goals, the first step with any camel during round pen training is getting his attention. Round pens create a training environment where this becomes easy. Their small diameters limit the camel's ability to flee or evade the trainer, and their shape limits his activity options. They offer great potential for opening good communication lines between

Fig. 8.5 The main author training a camel in the round pen

the trainer and the camel, and they can be used also to help the camel to focus on specific tasks.

Based on the main author's experience (Fig. 8.5), this is how a trainer should proceed during round pen training with a camel:

- Neutral: standing quietly, at the point of camel's shoulders, with shoulders parallel to his body is a "neutral" position.
- Move forward: turning shoulders slightly in order to face the direction in which the trainer wants the camel to move. If the camel does not move off right away, step sideways and in, towards the camel's hip, with shoulders still turned in the desired direction, to encourage him to move forward. Dropping back slightly behind the line of the hip drives the camel forward even more aggressively for an increase in gait.
- Slow down: stepping sideways so being in front of the shoulder line, ask the camel to slow down. If he doesn't respond, taking a step in, towards his head, should make him slow down.
- Stop: stepping towards the camel's head, and a step or two further says "Stop." If the camel instead of stopping, turns away, the trainer should go directly across the circle's diameter and turn him there, and continue until the camel realises he cannot run away left or right. As soon as the camel stops, the pressure should release.
- Turn: turning shoulders parallel to the camel, take a step sideways so the handler is in front of the camel's head, then step in as the handler turns his shoulders in the opposite direction from the camel's direction of travel. As the camel turns towards the wall, stay aware of that kick zone.

In this way, the camel will give attention to the trainer and the trainer will take control of the camel's movements. Getting the head, being able to catch all attention of the camel, will give full control right from his feet. Approaching the camel to catch him can still be tricky as the animal may fear the trainer. A technique from approach/walk away will be useful. This way to work is largely used while desensitising animals. Very good timing in the retraction from the pressure (aversive sensation) will be highly necessary. For a non-trained or mistreated camel, being around humans can be a stressful moment. In the beginning, it will be impossible to

touch the camel; the trainer will need to remain patient and learn mimetic, physical signals, camel can show as trainer is entering his comfort zone and adapt his movement forward. A very stressed camel will run away with only a step forward from the trainer. When the camel will stand still and allow trainer to enter his comfort zone for a short instant, trainer should go backwards again to give space to the camel to reward him. If the camel moves, as the trainer is now able to control his feet in case of its movement, the trainer should be able to stop the camel. It is very important for the trainer to not move his feet backwards in those moments. With time and repetitions, the trainer should be able to touch the camel. In the same method of approach/step away, once the camel is not moving anymore, it is time to introduce food to reinforce the training. Camel may not accept food due to the stress at first attempts. High-aroused animals may refuse to eat (McGreevy and Boakes 2006).

The 'comfort zone' of a camel during the initial phase of training may be large. Trainer will have to adapt his distance from the camel; larger the distance is, quieter it should be as there is no immediate danger for him. With a trained camel, one step backwards should be enough to give him space.

A comfort zone is when the camel is fully relaxed, living in the herd, roaming freely in a natural environment. In this comfortable zone, camel's brain is ready to learn as it has lot of free space to process new information. During training, the trainer should try to keep the camel in this mental and physical condition (muscles are relaxed, respiration and pulse rates are low). But as the trainer wants to teach new things to the camel, it will be difficult to stay in this ideal conditions. In the stretch zone, which is when the camel is a little stressed from being outside his habitual pasture, being in a new environment, it will feel more vulnerable. His brain is less free to accept all information as a part is taken by survival mode. Panic zone is when the environment completely takes over the camel. His brain can't focus on any cue; it is fully absorbed by survival reactions. Body is super tense, reactions are not controlled at all. This mental stage should be avoided as much as possible during training process (Palethorpe and Wilson 2011). Each camel has his own nuance between comfort, stretch and panic zone.

When the camel is standing and letting the trainer come close to him, the trainer will be in a position to start the desensitising work (Fig. 8.6). Being able to touch the camel, every place on his body without dangerous reaction is a safety act for the trainer. In a way to avoid dangerous reactions from the camel, a long stick can be used to touch it. Always in the approach/step away method, it's easier to start by touching camel hump as it is not an organ they use to protect first, like the genital area or base from the neck. Moreover, the hump is poorly innerved and consequently, poorly sensitive.

Rewarding the camel with food will highly improve his willingness. Also, it will create jaw movements, which help his relaxation. A camel calmly chewing his cud is a relaxed camel. A "head work" must be done, as the handler will need to put a halter on the camel's head.

A belief says that " if you can touch the head and especially the nose of your camel, you can trust him."

Fig. 8.6 The main author performing desensitisation work

After the camels accept to be touched, the following step could be followed to put the halter. It may be an oppressive sensation for the camel to see the halter coming directly at him. It's better to softly lay halter on his head by coming from sideways and not from the front. Halter should not be buckled up at the first attempt as the camel will probably take it as aggression and will try to escape. Having the halter on his head for the first time may create stress-related behaviour, but as described above he will get used to it quickly.

8.3.4 Use of Halter and Lead Rope

In the beginning, when the handler will put pressure on the lead rope, the camel will probably pull in a reverse movement to free himself, and a sort of fight will start (Fig. 8.7). Many solutions are available to the trainer. A second person can walk behind at a distance from the camel, this can help the camel to move forward and this is when the first handler has to release the pressure on the lead rope. So, the camel will learn to follow the front handler by negative reinforcement. If different trainers are working with the same camel, they should all use the same cue to ask for a behaviour and they should decide what is, or not, allowed as the response from the camel. One command must induce one answer. Many commands for the same answer will disturb the camel. Also, if trainers accept different answers from the camel, it will be confusing.

The camel should always have control of the environment during his training session and the trainer should adapt the time of the training session to each camel. Each animal has a different temperament and learning ability, so the trainers must

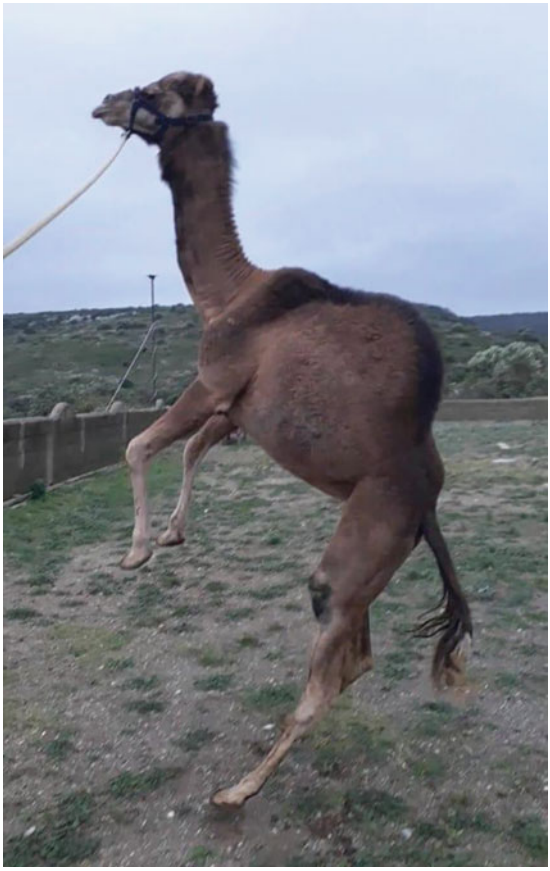

Fig. 8.7 Camel rearing as first reaction to the pressure

develop an individual training plan, train calmly and quietly, using minimally invasive pressures, and consider that each training session should not be too long or stressful. A camel with high arousal or when tired will learn less.

The training session should follow the ten principles of training in equitation science (http://www.equitationsciencetraining.net), now adapted to camels:

1. Train accordingly to the camel's ethology and cognition
2. Use learning theory appropriately
3. Train signals that are easy to discriminate
4. Shape response and movements
5. Elicit response one at a time
6. Train only one response per signal
7. Form consistent habits
8. Train persistence of responses
9. Avoid and dissociate flight responses
10. Demonstrate minimal level of arousal sufficient for training

Fig. 8.8 A dromedary camel trained for carriage

Following these principles, everything can be taught to a dromedary camel. One of the first exercises is to teach "parking"; the camel should stay quietly in a spot without any constraints (Fig. 8.8). When a trainer has taught to go forwards, backwards, sideways, stopping and parking, which is the base, the dromedary camel can be trained for more difficult tasks, as riding or driving (Fig. 8.8).

8.4 Are Camels Smart Animals?

When people ride camels they are curious and a little bit suspicious about this animal but when they have to train it, they are astonished how smart the camel can be. Despite their rough appearance, camels are confident animals. They are not so hard to train due to their ability to adapt their behaviour in almost all situations. They also have a very good memory, which allows them to roam in very large areas without trouble, and so gives them possibility to retain situations given by the trainer even years later.

> Camels are the most intelligent creatures I know except for dogs, and I would give them an IQ rating roughly equivalent to eight-year-old children. They are affectionate, cheeky, playful, witty, yes witty, well-possessed, patient, hard-working, and endlessly interesting and charming (Davidson, 2017)

If determining human intelligence can be tricky, it is quite harder to determine animal intelligence (e.g., see Pouydebat 2017). Some scientists have proposed an equation between body weight and brain's size called encephalization quotient (EQ) (Sousa and Wood 2007). On average encephalization quotient in animal is 1. On average the brain weight of the Bactrian camel is 626 g and the encephalization

quotient value is 1.3, indicating his high level of intelligence. The rhinencephalon, being a part of the archaic brain having the function of instinctive and emotional behaviour, is mature and well developed, in accordance with his good olfactory sense. The hippocampus, a complex brain structure that has an important docket in learning and memory function, is considerably large concomitant with ability of spatial memory. Adaptive behaviours of the Bactrian camel are corresponding to his anatomical features and are providing morphological evidence for the camel to adapt to his living environment. These anatomical features agree with the corresponding adaptive behaviours of the Bactrian camel and provide morphological evidence of the camel adapting to the arid and semi-arid environment (Chen et al. 2009). Camel hippocampus is nearly similar to humans and elephants (6.3 cm length and 0.9 cm width).

According to camel farmers, those animals tend to remember positive and negative experiences they met in their life. It is very common to hear stories about camels remembering someone who mistreated them, or returning to a land they appreciate after being moved to a foreign place. To our knowledge, there is no data regarding intelligence tests for camels (as maze test, learning ability test or memory test), but one reference involving small camelids (*Lama glama*) concluded, based on a mirror test, that they have an average intelligence for an ungulate species (Tansley 2011). There are some behavioural tests which can be used to study the ability to memorise and the ability to solve problems in animals; from the authors' knowledge these types of studies have not been performed in camels, so they are recommended to give a deeper knowledge on how to train and handle camels.

8.5 Conclusions

Camels are capable to adapt themselves to new environments and situations quickly. There are different methods to train them but only those based on animal learning theory are considered efficient and welfare friendly. Conditioning answers according to different stimuli, and rewarding using correct timing, allows a favourable way of training. A great trainer, with correct knowledge about camel behavioural reactions, should be able to obtain a very good life companion from a camel. In deduction from good training, camels should become easier to manage, as an individual or as a herd animal. If camels are tamed and handled using learning theory, their relationship with humans will be better, and their quality of life from farm to fork and from birth to death will be enhanced. Moreover, appropriate handling of camels will be safer also for camel handlers. Consequently, more studies on the effects of training methods on camels are recommended as well as studies to investigate the camel's cognitive ability.

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