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Habituation

6 Ways to Harness a Natural Learning Process



WORDS BY Dr Andrew McLean
Equitation Science International

Horses are flighty and suspicious by nature but they can also easily get used to (habituate to) things that would normally cause them fear.

A thorough understanding of the behavioural science that explains the learning mechanisms which result in habituation has enabled Dr Andrew McLean from Equitation Science International, to adapt this natural process into six reliable training methods that work with all horses and make habituation faster, safer, and much more reliable.

What is habituation?

Habituation is an important learning process that makes animals much more efficient in their environment by allowing them to get used to all the things that are harmless. After all, it would be a waste of energy for them to be constantly shying at things that don't matter. Horses soon get used to things they initially found scary - or at least they should do!

Horses typically have an extremely sensitive flight response (startle response) and the nature of stimuli that startle them are as follows:

1. The magnitude of the aversive stimuli
2. The novelty of the aversive stimuli
3. The multiplicity of aversive stimuli (e.g. sound and visual stimuli combined)
4. The proximity of the aversive stimuli

5. The random appearance or occurrence of the aversive stimuli
6. The movement of the aversive stimuli, especially if it is:
 - Erratic
 - Advancing towards the horse

In the context of horse training, when humans habituate animals to stimuli, we call these procedures "desensitisation techniques". We aim to desensitize the horse to some stimuli (such as humans, rugs, bits, girths and other equipment, traffic, etc) and yet sensitise him to other stimuli (such as rein and leg aids, electric fences etc).

The police horses that calmly stand in front of screaming crowds at the football game have been carefully habituated to the many different stimuli they may encounter in their daily work.

The flight response

One of the aspects of the flight response that is worth thinking about is that the horse is really wired for flight. It has the biggest amygdala (the gland in the brain responsible for flight) of any domestic animal. Furthermore, in the last few decades we have purposely bred a lot more flight response into our sport horses; the dressage horses of the 70's for example, were colder and duller than the ones today; today they are a lot more reactive. This is why a thorough understanding of the habituation process and desensitisation techniques is even more relevant.

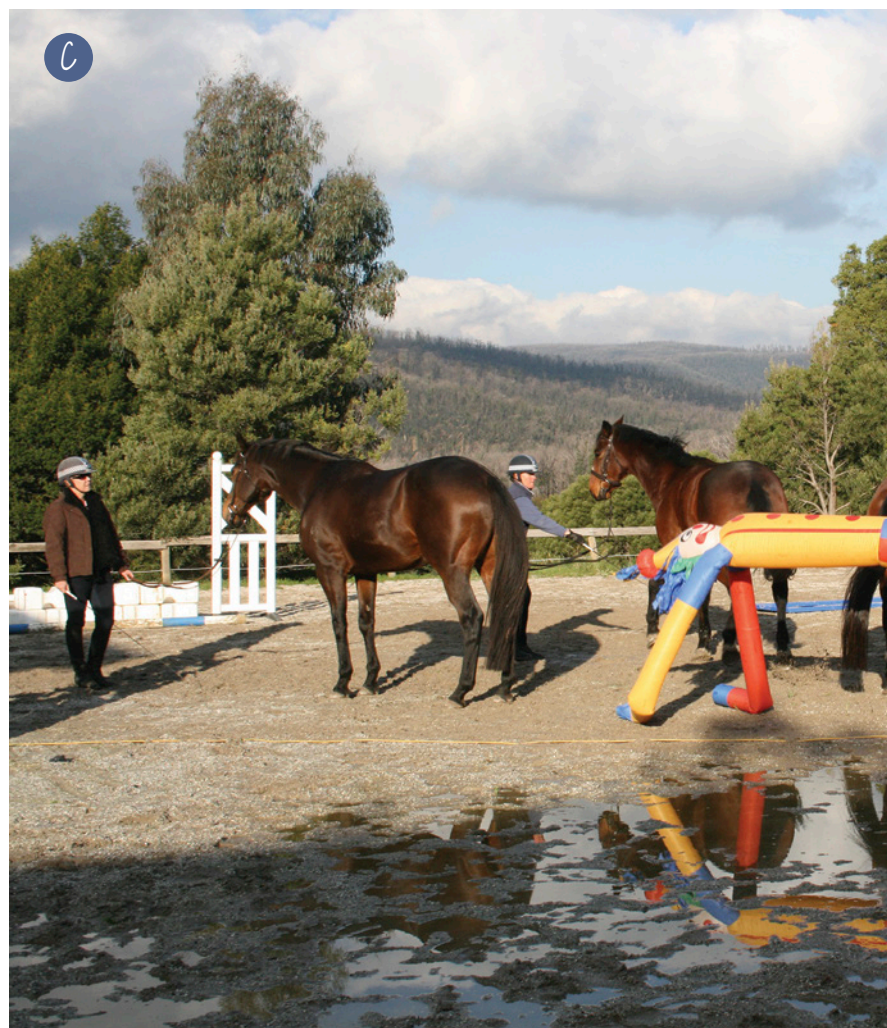
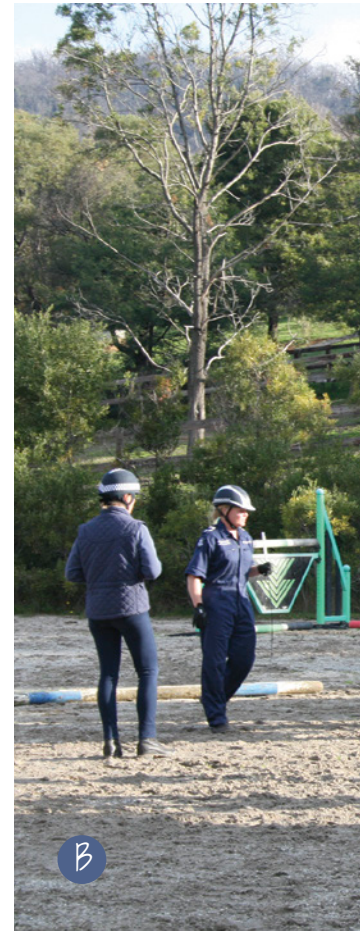
Fast and far

In horses, fear itself (the fear response) is rewarded by just two things: 'fast' and 'far' (the fact that the horse goes fast, and the fact that the horse goes far). The faster the legs move and the further away the horse goes, the more afraid he becomes.

Fast legs and distance is what reinforces the fear response, it is not necessarily about anything else (e.g. the 'scary' object itself), there's a cause (and sometimes there's even no cause if he learns to do it in one place and the place triggers it), and if he shies to the left and he goes really fast to the left and far, he will be more likely to shy and show fear next time than if he didn't go fast and he didn't go far. In fact, escape is so reinforcing that the greatest abundance of the neurotransmitter dopamine in the brain is found in the activity of the substantia nigra, which is responsible for movement.

This is why the key lies in stopping the 'fast and far' from happening, rather than riding through it. Allowed to be expressed, the fear reaction is cumulative, it will mount up, and add up to a battery of flight responses that will appear later. After a lifetime of dealing with fear reactions, my position is very clear:

Don't let the horse do it!



IMAGES A, B & C: Getting horses used to a moving, giant air puppet is a reasonable challenge.

The process is speeded up and more successful by using the overshadowing method of habituation.

Habituation is the process where the horse learns to remain calm in the presence of a stimuli that previously elicited fear.

Although all these police horses were initially scared, successfully habituated and learned to stand 'parked' and unrestrained while ignoring the unpredictable and erratic movements of the inflatable puppet and the noise of the air pump that operates it.

All photos courtesy of ESI.



This gradual habituation takes a while and has an important drawback in that, the fear reaction the horse expressed in the beginning, can return spontaneously (and unannounced) in the future.

In 1995 neuroscientist Joseph LeDoux showed something radically different about fear that we never knew before.

Until then, I used to teach students that animals, including horses, can learn to do things and they can also learn to forget things – we call that ‘extinction’.

LeDoux said that, although this is true with other learned behaviours, this is not the case with the fear response – fear responses are never forgotten, they are indelible and you cannot erase them.

Now we know he was mostly right, although under certain conditions and with certain drugs, an initial fear reaction can be at least diminished.

Nevertheless, this is very futuristic so, as far as diminishing fear in horses is concerned, we should consider that fear reactions cannot be erased. What we can do instead is suppress fear responses with desensitisation techniques.

Once an animal has practiced a fear response it will stay in its head but, what we don't know, is whether it will become a problem in the future. This probably varies with different individuals and may depend on the size of the original fear response.

In any case, a reasonable fear response (by going fast and far with his legs), will be stamped on the horse's brain like something that's beneficial and, even if you re-train it, given the right conditions of confusion, fear, etc, it is likely to return with alarming speed at a different time.

Therefore, to me it is clear:

When working with horses, do as little as possible to induce fear and as much as possible to remove it.



It is all about keeping the horse's legs clearly under your control - and isn't that what dressage and training is all about? It is also about being very careful how we train, because if we allow the horse to express a flight response in a certain situation e.g. outside the competition arena, in-hand or while in training, we are allowing him to do it (we are confirming his fear). But it is not as simple as just stopping the horse from running. This can, in some levels of arousal, result in more fear.

Gradual habituation in nature

Gradual habituation is that which occurs over time when the horse is free to escape. The horse first practices his escape behaviour, and gradually closes in on what he's afraid of until eventually he stops reacting to it.

Left to their own devices, horses gradually habituate to features of their environment, such as cars, trains, low-flying planes, dogs, children on bikes and rustling plastic bags.



A

IMAGE A: Many horses are afraid of sprays, this police horse is being habituated to a spray by blending the spray stimulus with something he is already habituated to - the feeling of being hosed.

IMAGE B: A police horse in training. Although initially frightened by the ribbons, the horse habituated quickly using the overshadowing technique explained in the following pages.

IMAGE C: Using the same overshadowing principles, instead of walking forward and back, the handler is asking the horse to lower and raise his head while another police officer beats on a drum.

All images courtesy ESI.



B



C

Here is what we can do:

1. Systematic desensitisation

The term refers to a process akin to gradual habituation but where the approach of something scary or the movement toward something scary is managed by the handler. In a controlled situation, the animal is initially exposed to low levels of the scary object and rewarded when it remains relaxed or shows an appropriate response.

An increase in the level of the stimulus is not made until the animal reliably fails to react to the previous level. For example, police horses are often systematically desensitised to noise, smoke, flags, rapidly advancing people and objects. Positive reinforcement (e.g. food, wither stroking) can be used as an additional reinforcer for appropriate behaviour.

Promising research has shown that higher levels of arousal soon transform into investigative behaviour when a horse is allowed to stand still for around 13 seconds or more (providing the scary stimulus isn't moving!). So, just being patient and taking time, can do wonders. You may well find the horse wanting to investigate the scary object if you just give him time.

Note:

With all desensitisation methods, make sure you desensitise the horse well beyond the apparent habituation level.

I say this because physical habituation (i.e., the behavioural signs you can see) occurs before physiological habituation (signs such as heart rate, eye temperature).

If you habituate well beyond the point of apparent habituation, i.e., more sessions than you think are necessary at each stage) you will be more likely to have permanent success. If you don't, you invite spontaneous recovery of fear.

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IMAGES A & B: The overshadowing process starts with training the horse to step forward, stop, step back and park consistently and from very light rein aids.

IMAGES C & D: When the clippers are first introduced, the horse tries to get away and becomes heavy (stops responding) to the light signals.

IMAGES E & F: The clippers are kept running at a distance that elicits a minimal fear reaction until the horse responds again to the light 'step-forward' and 'step back' rein signals from the handler. Obtaining lightness is a sign that the level of fear has lowered and you can safely progress to the next stage.

IMAGES G & H: Gradually, the clippers are brought in closer and closer until the handler is able to make contact with the horse's body. Each time the horse reacts less and becomes light to the signals faster. Soon he is relaxed enough with the process to stand with a loose rein. The process took just around 20 minutes.

Photos by Cristina Wilkins

When dressage horses are ridden on a 'contact', this means that they must habituate to a certain level of rein and leg pressure but still react when the pressures increase above 'contact' level.

2. Counter conditioning

Counter conditioning is actually not habituation, but it does serve to desensitise the horse to things he was formally afraid of. It is the process by which a stimulus changes from fearful into something positive, usually by becoming associated with the arrival of food or something the horse likes.

A very good use of counter conditioning is to desensitise the horse to an audience clapping, a common problem shared by upcoming dressage champion Hiscox Aliano ridden by three time Olympian British dressage rider Richard Davison.

After watching my demonstrations at the 2011 Global Dressage Forum, Richard spoke to me about Aliano's fear and I suggested he try counter conditioning to turn clapping into a secondary reinforcer; that is to turn the clapping into a signal that announces the arrival of food (just like the clicker does in clicker training, or the bell in Pavlov's famous dog experiment).

He went home and trained, and it seemed to be working. At his next big qualifying show, the audience clapped at the end of his test, and instead of reacting in his usual way, Aliano turned his head towards David expecting his food treat!

Never underestimate the power of counter conditioning. Horses that are almost impossible to orally de-worm can be re-trained to calmly take the de-wormer in only a few minutes. I have also used it very successfully on elephants that have major fear reactions toward eye treatments. It's a deal-breaker!

3. Overshadowing

The overshadowing process is based on the fact that animals (including humans) can't give their attention to two things at once. Attention mechanisms are a one-way street, so when an animal is exposed to two strong stimuli at the same time (for example the clippers that make him want to run away and the handler that makes him step forward and back) he can only really listen to one of them.

If the clippers are telling him to run away but you can successfully make the horse take a step back, you tip the balance to a point where he is no longer showing a reaction to the clippers. Coupled with systematic desensitisation, where the clippers are only very gradually brought toward the horse (i.e., keeping the fear threshold very low at each stage), overshadowing the low fear arousal with a previously well-trained step-back response is very successful.

The clippers must be brought toward the horse very, very gradually and only when the horse can step back and then forward to a very light signal from the handler can the clippers (or injection) be moved a little closer. I teach vets how to do this in many different countries.

This technique is not just a distraction, the very next day the horse's fear of the clippers is either gone completely or greatly diminished.

Overshadowing works very well, not only for habituating horses to clipping, but also for other flight responses such as needle/injection phobia, rugging and girthing for the first time.

Another valuable aspect of the overshadowing process is that it accurately diagnoses the horse's level of fear. This is determined by noting how well the horse responds to the handler's signals in the presence of the fearful stimulus - how light he is. The heavier he is the more frightened, and the lighter he is the more the fear is diminishing.

You should continue with the step-back-step-forward responses at every point until the horse responds calmly and lightly to the in-hand signals. For very fearful horses, you would begin with the clippers a long distance from the horse (10 or 15 metres) and be prepared to take sufficient time to overshadow the fear response.

Using heart rate monitors and eye thermography we have shown that, once it has been conducted successfully, however (which may take two or three sessions), the horse will have, for all intents and purposes, lost his fear of the clippers/needle entirely.

Using counter conditioning in tandem with overshadowing can accelerate the desensitisation process and is recommended for a particularly fearful individual.

4. Approach conditioning

Approach conditioning is based on the idea that when animals chase things they become 'brave' or not afraid of them.

It is easy to see this process happening when you teach a horse to chase and push away a big ball. In the beginning, the horse doesn't want to go near the ball, but if the ball is made to roll away from the horse, the horse will progressively get closer to the ball of his own accord. He will graduate from just sniffing the ball (investigative behaviour) to actually touching and nudging the ball. At the moment he nudges the ball away from him you will see his whole attitude change - he will first be completely surprised and, from then on, much keener to go after it and push it away again.

Approach conditioning in practice

This is a great exercise to do with kids and ponies. For safety's sake you can do it in-hand first, but then you should follow through and generalise the situation with different coloured and different size balls, with and without a rider, as well as in different places.

I have also used this method successfully in the police force, particularly with horses that are afraid of moving objects, for example, with a horse that is scared of a bobcat (digger) or motor bike, we get the horse to chase the bobcat or motor bike around the arena, frequently stopping and letting the machine move away, then chase it again. Soon the horses will get close enough to touch the machine, something that would not happen otherwise without using a lot of pressure.

Approach and retreat is NOT a habituation method

Some trainers explain the 'approach and retreat' technique as a means to get horses used to things, such as handling different parts of the body or scary things like clippers, however, approach and retreat is not a habituation method.

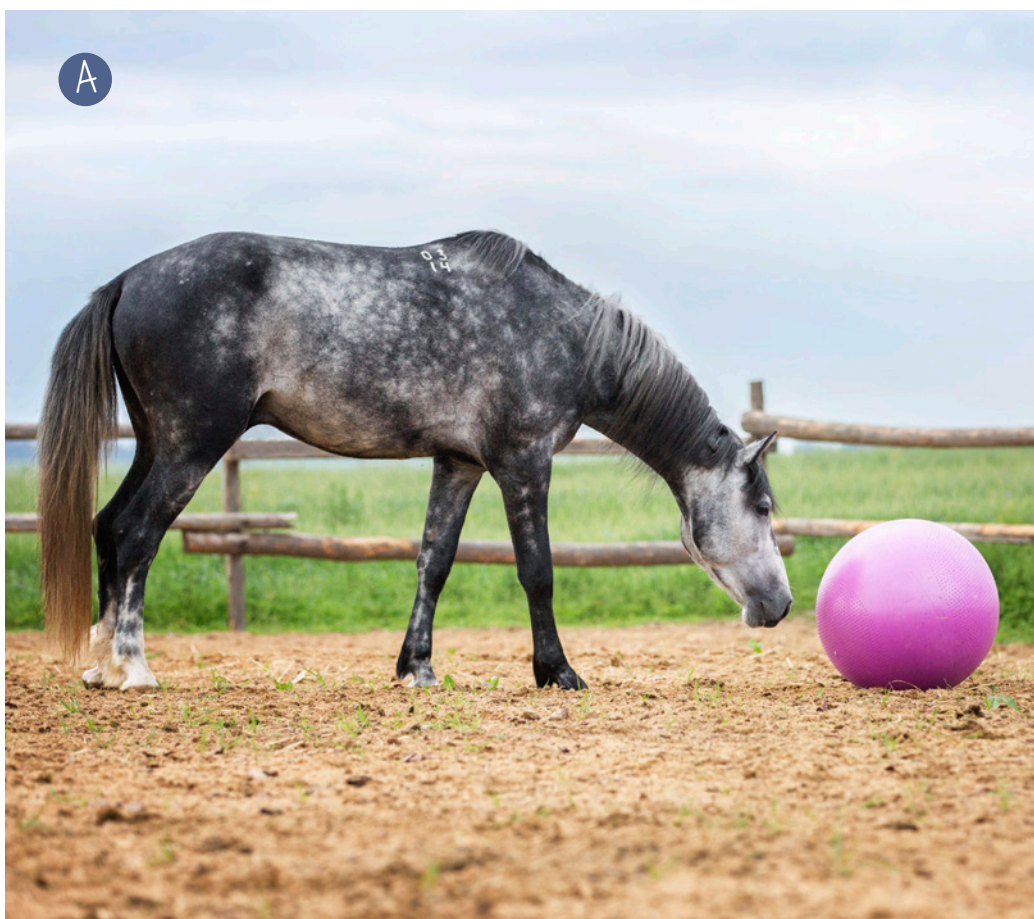
Approach and retreat relies on taking the scary thing away (retreating) when the horse is doing the right thing (standing still). Approach and retreat is actually a form of negative reinforcement (pressure-release), where the aversive stimulus (pressure) is removed to reward the correct response.

This learning process is very different to habituation, which is about the horse 'enduring' the presence and/or contact with the scary stimulus, rather than 'making it go away' by responding correctly.

A good example of this is a clipping situation. If you were to use approach and retreat, you would reward the horse for standing still by taking the clippers away when he does.

The problem is that if you turn the clippers off each time the horse stands still, he is learning to 'make the clippers turn off' by standing still. At some point he has to go through 'enduring' the actual clipping process and, at that time, he will find out that standing still no longer works for him.

In order to successfully habituate the horse to clipping, it is best to keep the clippers going at a distance that arouses a very low level of fear until he relaxes within himself, then gradually and systematically closing the distance by repeating the process.



5. Stimulus Blending

This is another form of habituation where you blend-in a novel or fearful stimuli with another that the horse is already used to. It is particularly useful with horses that are afraid of sprays or aerosols, and those that are head shy.

Stimulus blending in practice

In the case of aerosols, we first teach the horse to get used to being hosed. We hose all around him and when he is used to that, we introduce the aerosol and soon the hose disappears and the aerosol remains on its own.

If you break down the features of an aerosol for example, you will find there are three main characteristics:

First you have the look of the bottle; this is probably the least important characteristic as most horses don't seem to mind the object much.

Second is the sound of the aerosol, and horses do mind that 'shh' sound. Hosing also has a sound, so by blending the two sounds together you get a much smaller reaction from the horse, and the habituation speeds up.

The third aspect is the feel of it, and on dry hair the aerosol has a particular feel, but on damp hair it feels different, the horse has probably never felt that, which is why hosing is also useful.

Stimulus blending also works well with head shy horses that don't like having the top of their heads and ears handled (see image on right).

We use a damp towel and start rubbing the damp towel all over the horse's head. In the beginning you may not get very far, but after a few minutes when you start to make progress you can then begin to slip your fingers under the towel and start touching the horse's ears, progressing until you remove the towel completely. It works because the feel and other senses are quite different, you get a much smaller reaction from the horse and the habituation process speeds up.



IMAGE A: At the moment the horse nudges the ball away from him, you will see his whole attitude change – he will first be completely surprised and, from then on, much keener to go after it and push it away again. This is approach conditioning.
Image source: www.shutterstock.com

IMAGE B: Using a damp towel to blend in a new stimulus – your hands touching the horse's ears. This is an example of stimulus blending. Image courtesy ESI.

6. Response prevention

Many riders, trainers and handlers use this method in one way or another. For example, when the horse is held still while the rider gets on him or until he gets used to things. Restraint may be applied through stabling, yarding, tying up, or restricting the horse's movements in-hand or under saddle. It works because you prevent the horse from moving his legs and making distance.

Response prevention, however, is a continuum of increasing bad welfare because it can become too intense and at a certain point of fear, may become 'flooding'.

Flooding is when you expose an animal to an overwhelming threshold of fear. When this happens, the horse is likely to develop a negative association with the scary object (as well as with the person that is there and the place he is at). His fear levels may increase and/or he may panic and escape.

Restraining a horse to prevent a fear response can make the process a worse experience for the horse, so any desensitisation method should use only the lowest thresholds of fear.

The dark side of habituation

There is a downside to the process of habituation. Horses can, just as easily, become dull to the aids through habituating to nagging legs and hands.

The horses that are labelled 'lazy' have simply habituated to the rider's leg aids and those that pull or are labelled 'hot' have habituated to mouth pain and pressure from the bit.

This happens because of the incorrect use of negative reinforcement (pressure-release) which is a technique that should sensitise the horse to respond to light versions of the aids.

Common training mistakes that result in dull horses include:

- The pressure (or aid) is not released when the horse responds. For example, a heavy rein contact is maintained after the horse performs a downward transition.

- The pressure (or aid) is not increased to achieve a response. For example, the rider keeps kicking every second stride or so to maintain the horse's gait.
- Self-carriage is not prioritized at every level of training. For example, the horse is pulled into a round frame and kept there with continuous rein pressure.

When dressage horses are ridden on a 'contact', this means that they must habituate to a certain level of rein and leg pressure but still react when the pressures increase above 'contact' level.

This presents a challenge to less-skilled riders and an even bigger challenge to their horses, and often results in horses that have habituated to one or more of the aids or conversely hollow, hyper-reactive horses that become anxious about unsteady rein or leg connections.