

## How “natural” training methods can affect equine mental state? A critical approach – a review\*

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Among equestrians the “natural” training methods of horses are gaining widespread popularity due to their spectacular efficiency. Underlying philosophy of trainers - founders of different “natural horsemanship training” (NHT) schools, along with other not well documented statements includes argumentation of solely welfare- and human-friendly effects of NHT in the horse.

The aim of this review was to screen scientific papers related to NHT to answer the question whether „natural” training methods may actually exert only positive effects upon equine mental state and human-horse relationship. It appears that NHT trainers may reduce stress and emotional tension and improve learning processes as they appropriately apply learning stimuli. Basing on revised literature it can be concluded that training is successful provided that [i] the strength of the aversive stimulus meets sensitivity of an individual horse, [ii] the aversive stimulus is terminated at a right moment to avoid the impression of punishment, and [iii] the animal is given enough time to assess its situation and make an independent decision in the form of adequate behavioural reaction. Neglecting any of these conditions may lead to substantial emotional problems, hyperactivity, or excessive fear in the horse-human relationship, regardless of the training method.

However, we admit that the most successful NHT trainers reduce aversive stimulation to the minimum and that horses learn quicker with fear or stress reactions, apparently decreasing along with training process. Anyway, NHT should be acknowledged for absolutely positive role in pointing out the importance of proper stimulation in the schooling and welfare of horses.

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Learning involves changes in animal's behaviour resulting from its experience and circumstances [Tarpey 1975]. The trainer and his/her behaviour exert a considerable impact on horse's behaviour and emotions through sensations that the animal experiences. During training, the horse is typically exposed to isolation from representatives of its own species, presence of new objects and proximity to humans, which may evoke alertness or fear. „Natural Horsemanship Training” (NHT) is a relatively new concept currently gaining wider popularity with riders and coaches due to their spectacular efficiency, although the approach has been already employed for a long time. We would like to indicate, however, that in our opinion the term „natural” training methods is a certain misuse, as these rely on learning processes that are in the nature of all animals as each type of modification of behaviour through learning is based on innate natural processes of an organism. Hence, any type of training can be termed “natural” if it results in newly acquired knowledge.

Although several different NHT schemes have been developed, all of them are premised on the assumption of understanding of natural equine individual and social behaviour and that the training based on such understanding assures further agreeable coexistence between animals and humans. In the equestrian environment, NHT methods are believed to build better relationships between the horse and the trainer, and a vast majority of people claim that NHT is a highly positive experience for horses. NHT has been described in detail in scientific and popular literature [e.g. McGreevy 2007, Murphy and Arkins 2007, Kędzierski *et al.* 2012, Roberts M. 2002], however it has been reported that “natural” methods do not differ substantially from the traditional ones [Birke 2007] as misunderstandings in human-horse interactions may appear in each method of training. Since one of the main claims of NHT are solely welfare- and human-friendly effects of NHT in the horse, this specific claim was of our particular interest and the subject of the present review.

The aim of this paper was to review scientific papers related to „natural” training methods from the perspective of animal learning and in relation to the results of equine studies and to answer the questions (1) how “natural” training methods can affect equine mental state and (2) if there are sufficient premise to claim that “naturally” trained horse experiences solely positive emotions.

### **Negative reinforcement**

Horse trainers who apply NHT methods typically work inside a round pen, where they send visual signals to convey their intentions to the animal. Each attempt at evoking a proper response from the horse is reinforced by a change in trainer's behaviour. In majority of cases, the animal is being initially exposed to aversive stimuli, which are removed promptly after horse's response desired by the trainer (negative reinforcement).

In the horse training, negative reinforcement is widely used for practical reasons. Contrary to dogs, that are highly feed-, award- and human-dependent, the horses are more cautious and harm-suspicious. Thus, relieve from even light discomfort is much more effective reward in horse riding than food or tactile award, although their beneficial effects in horse training has been found [Sankey *et al.* 2010]. Properly used negative reinforcement *i.e.* its adequate and consequent withdrawal is the key to success of skilled trainers, irrespectively if NHT or “traditional” method is applied. Predictability of consequences of its behaviour makes the horse quickly adapt to humans demands, and to reduce to minimum the discomfort caused by aversive stimulus. The quicker this adaptation is, the more readily the horse may accept successive steps of the training.

This is particularly important, as improper management of stimuli, e.g. delayed removal of the stimulus, produces the effect of punishment [McGreevy and McLean 2009]. It was demonstrated that when punishment was applied, horses made fewer mistakes, but they needed more time for decision-making [after McCall 1990]. Simultaneously, even a 10-second delay in application/removal of the stimulus causes marked impairment of the learning process [McLean 2004]. Animals learn to recognize whether specific stimuli predict positive or negative events [Mendl *et al.* 2009], which leads to effective response to the circumstances. The possibility of prediction of events provides the animal enough time to produce an adequate behavioural response and it is used for making the right choices in the future [Schulz *et al.* 1997]. The possibility of exerting an impact on the surroundings, *i.e.* being the cause, constitutes positive reinforcement in itself [Markowitz and Line 1991], which facilitates learning.

### **The negative impact of inappropriate reinforcement on subsequent horse’s behaviour toward humans**

“The feeling of control” of the environment definitely reduces stress because human behaviour could be predicted by a horse, which increases animal’s trust in the human actions [Baraglia *et al.* 2011]. However, in order to obtain positive effects, the use of negative reinforcement must fulfil specific conditions [McGreevy 2007]. The first condition is adjustment of the strength of the stimulus to equine mental state; the other is immediate removal of the stimulus after the animal exhibits the expected reaction. Unfortunately, these conditions are frequently difficult to fulfil, which can result in detrimental effects in a horse [McGreevy and McLean 2005]. In such a situation, one cannot expect a positive impact of NHT methods on animal emotions. Apathy and learned helplessness [Webster 1994], often observed when traditional methods are used, may also be present when NHT methods are applied. In both cases, the inappropriate use of stimuli leads to impaired stimulus predictability or lack of possibility to control it by behaviour changes. Again, the form of training, *i.e.* appropriate conditions to assess the situation and make a decision, rather than the training scheme determines horse’s emotions.

Learning has been shown to be effective only when an unexpected event takes place [Staddon 1983], thus evoking the “anticipation” phenomenon, which activates a specific centre in the brain and enhances the feeling of pleasure [Panksep 2005]. The higher the stimulation of the horse brain with appetitive stimuli is, the more readily the animal learns the new experience [Murphy and Arkins 2007, Schultz *et al.* 1997]. Inappropriate application of aversive stimuli in the training of horses may evoke excessive fear, which impairs animals’ learning ability and reduces the safety of the interaction with the animal [Press *et al.* 1995, Richard *et al.* 2000, Herrero *et al.* 2006, Svartberg 2002]. It has been also shown that horses with a lowered reactivity threshold and an elevated level of fear need more time to learn specific tasks [after McCall 1990, Lindberg *et al.* 1999, Visser *et al.* 2003]. On the other hand, some reports demonstrate that certain level of fearfulness improves horses’ performance in associative tasks [Lansade and Simon 2010]. However, this cursory discrepancy can be explained. Emotional excitation enhances episodic memory associated with the amygdala, which modulates the activity of the hippocampus. Increased activity of the amygdala is a response to both negative and positive stimuli [Haman *et al.* 1999]. Therefore, a certain level of alertness helps in improving the learning performance and associative processes; hence, the animal forms an association with concurrent phenomena more readily. The learning process is the most effective when animals are peaceful [Christensen *et al.* 2006], although a dose of concurrent arousal should be present [Meehan and Mench 2007]. However, according to the Yerkes-Dodson law, when the individual’s specific threshold is exceeded, the arousal level becomes too high and limits memorisation and learning ability. Thus, the level of fear has various effects on learning performance, and the excessive emotional response may have critical consequences [Forkman *et al.* 2007]. When too intense, negative reinforcement will evoke excessive fear and the horse will be difficult to handle [McCall 1990]. In such a case, the trainer fails to achieve desired response by a horse and the inappropriate animal behaviour could be reinforced. It is difficult to establish a uniform level of aversive stimuli for all animals, as it has been proved in dogs, such temperament traits as shyness/boldness, sociability, curiosity, and activity or timidity, potentially impacting trainability, are genetically conditioned. Moreover, their variability is not exclusively related to breed differences [Svartberg, 2002]. Each animal has its individual reactivity level that should be assessed by a trainer at the first contact with the horse. The first experiences of a human are also particularly important to the horse during subsequent training. Various studies have shown that early experiences may exert a significant impact on learning skills [McCall 1990].

Even if stimulation enhances learning new experiences, emotional sensations may differ markedly depending on the type of the stimulus (aversive/appetitive). Similarly to other animals, horses have long-term memory [Hanggi and Ingersoll 2009], and their individual experiences are reflected in emotional relationship with the environment [Christensen *et al.* 2006, Sankey *et al.* 2010]. At this point, one might raise the question of how the NHT, but also “traditional” methods affect perception of

the human and whether, as is presented by trainers, they build positive relationships. In accordance with the mechanism of classical conditioning, an individual acquires emotions towards an object by perceiving it as an aversive or appetitive stimulus. In this case, the human is the stimulus, and the emotions evoked in horses may vary from trust and confidence to fear and high stress [Demaree *et al.* 2005, Henshall and McGreevy 2012] relatively to proper stimulation by a human rather than the method itself.

A process of generalization of a phenomenon in animals is particularly strong in the case of fear or negative emotions. Excessive application of aversive stimuli for negative reinforcement may contribute to negative associations, which can be expressed in various contexts. Even if horses appear to be able to recognize humans in a photograph [Koba *et al.* 2004, Stone 2010] fear of humans could be easily generalised [e.g. Ghirlanda *et al.* 2002, Lensink *et al.* 2000, Fureix *et al.* 2009b, Hausberger and Muller 2002].

### **Do „natural” training methods evoke fewer negative emotions in horses than the traditional training methods?**

The level of growing fear in the horse can be manifested by the characteristic chain of behaviours that could be classified to three phases, as proposed by Leiner and Fendt [2011]. According to authors cited, following the exposition to a novel object, during the first phase the object is recognised and evaluated by a horse. This is manifested by upper lip elongation and neck muscles tension. In the second phase of moderate fear response, weak avoidance and vocalisations occur. In the third phase, an intensive fear response is manifested by a horse (a flight). Although above classification relates only to the reaction toward a static novel object (mobile objects can cause instantaneous startle response) and the behaviours like elongated lip could also be observed in completely different situations (for example during scratching the withers) this description generally reflects the process of evaluation and reaction to the object or situation potentially harmful to the horse. Then, it is vital that the trainer appropriately assesses the level of arousal in the horse at a given stage of the training. When the trainer recognizes the subsequent behavioural sequence of rising horse’s excitation, he/she should know when to remove the aversive stimulus. As indicated by Leiner and Fendt [2011], prevention of a strong fear reflex requires good observation and knowledge of behavioural signs. So, we admit that NHT trainers are usually very skilful observers and thanks to long life experience they instinctively know how and when apply or withdraw the stimulus. It should be emphasised, that the most successful NHT trainers reduce aversive stimulation to the minimum and the horse learn quicker with fear or stress reactions apparently decreasing along with training process. From this perspective, the advantage of any training methods providing the animals with enough time for assessment and concentration at only one aspect of learnt element at a given moment, which results in choosing a behaviour pattern and the moment it will be voluntarily displayed by a horse seems doubtless [Visser *et al.* 2009, Washburn and

Tagliapietra 2005]. Notwithstanding quick progress of horses in NHT is impressive to the spectators, except for very few trainers, the majority of their successors should be trained by the founders of NHT schools to achieve similar results. It means that not the method but the training and the education of good observation and prompt response to horse behaviour are crucial for successful horse training. Anyway, as amateur riders but also an increasing number of sport competitors are interested in high level of welfare of their horses, NHT should be acknowledged for absolutely positive role in pointing out the importance of proper stimulation in the schooling and welfare of horses.

### **Do techniques of „natural” training methods provide horses with the feeling of safety in the presence of the human?**

Horses are sociable animals that maintain relationships with their group members [Linklater 2007, Wargin 2003, Feh 2005]. They express their social preferences by closer proximity, keeping company, or affiliation behaviour, such as allogrooming [Sigurjonsdottir *et al.* 2003, von Dierendonck *et al.* 2004]. It has been suggested that horses' social skills may be useful when establishing complex relationships contact with humans [Kruger 2007, Linklater 2007, Hausberger *et al.* 2008]. However, in the case of various species of domesticated animals, including horses, there is no evidence that they treat humans as members of their own species so the claim that the horse sends analogous signals to the human as to high-rank individuals is not scientifically justified [McGreevy *et al.* 2009]. In contact with humans, horses mainly rely on the instrumental conditioning effect and, depending on the human reaction, learn the behaviour appropriate from human point of view. Contrary to NHT trainers argumentation, it seems that during the „natural” training, the horse does not follow the human because it feels safe and accepts the human as a herd leader, but because the human removes aversive stimuli in response to animal's gestures that reflect higher submissiveness to the trainer or the relaxation (e.g. lowering of the head – Rietmann *et al.* 2004). The affiliation signals that shorten the distance may be wrongly interpreted by the human [Goodwin 1999], and recent research have shown that horse's response to humans is context-specific and may be based on negative reinforcements rather than on the social strategy [Kruger 2007, Warren-Smith and McGreevy 2008, McGreevy *et al.* 2009].

Another issue is hand feeding, which is a positive reinforcement since food is primary appetitive conditioning stimulus. Many papers show unambiguously that positive reinforcement is the most effective training tool [e.g. Lieberman 1993, Sankey *et al.* 2010, Waran 2003], although application of such stimuli only in horses are impractical [McGreevy 2007]. The positive impact of rewarding has been widely discussed and reported in scientific literature; yet, this kind of reinforcement is still unwillingly applied in equine practice based on the conviction of its negative effect on equine behaviour which undoubtedly reveals the partial ignorance of documented

scientific research. It has been shown that in the process of young horse training rewarding evoked positive responses of horses to humans, which persisted during subsequent months [Sankey *et al.* 2010]. Additionally, enhanced interest in training and improved memorisation ability were observed. The use of positive reinforcements motivates horses to confront challenges and undertake learning, and ensures perception of training as positive interactions [Sankey *et al.* 2010]. This is related to activation of neurophysiological processes associated with the dopaminergic system [Jay 2003]. Moreover, expecting a reward itself produces the same effect, which is not the case when aversive stimuli are employed [Schulz *et al.* 1997].

It is probable that the theories disseminated in the equestrian environment suggesting a negative impact of rewarding by hand-feeding have their source in inappropriate timing of the rewards. By giving the treat, we use positive reinforcement, but the question is what in fact has been reinforced. If the horse was rewarded after an inappropriate response, the response was actually reinforced. Therefore, the problem is not associated with hand-fed rewards and treats in animal training, but rather in the wrong response reaction of the human, *i.e.* inappropriate timing of this reinforcement.

Presented discussion and the review of literature of the subject lead to the conclusion that there are no scientific reasons to claim that „natural” training methods evoke only positive emotions in horses, strengthen the human-horse relationship, or establish interactions based on trust in the human. Whatever a method is applied during training, it can reduce the stress and emotional tension and improve learning process if following principles are fulfilled:

- individually adjusted strength of the aversive stimulus is applied so as to evoke very subtle negative emotions (slight fear),
- removal or application of the aversive stimulus should take place at the proper moment, so as not to achieve the effect of punishment, but to enhance the appropriate animal – response and provide the animal with the feeling of control of the environment and ability to associate its behaviour with human behaviour,
- the animal has enough time to assess the situation and aversive stimulus and make an independent decision resulting in adequate behavioural reaction.

Neglecting any of these conditions may lead to substantial emotional problems, hyperactivity, or excessive fear in the horse-human relationship. Since training of horses relies mostly on aversive stimuli and negative reinforcement, there is a very fine line between its positive and negative impact on animal mental state. By employing inadequate stimulation, one may produce a hyperactive animal that will respond violently to environmental stimuli and exhibit negative perception of the human, whatever the method is used. Hence, as there are a low number of equestrian trainers who employ properly methods based on conditioning processes of horses and achieve excellent outcomes, we are of the opinion that not the method, but individual skills and knowledge of the trainer are crucial in successful and welfare friendly training of the horse.

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