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Original Article

Miniature horse training (*Equus caballus*) for use in equine assisted therapy, according to Equine Learning Theory

Treinamento de cavalos miniatura (*Equus caballus*) para utilização em terapia assistida por equinos, segundo a Teoria do Aprendizado Equino

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ABSTRACT

Successful and safe Equine Assisted Therapy (EAT) relies on proper horse training. Two inexperienced trainers applied Equine Learning Theory on three miniature horses destined for use in EAT, under the supervision of an experienced horse trainer. This six-month program included the following tasks: halter placement (*catch*) and corporal contact acceptation (*brush*), limb suspension for hoof cleaning (*hoof*), halter leading (*lead*), step back (*back off*), whip acceptation as an extension of the trainers' arm (*whip move*), corporal and verbal cues for circular movement (*lunging*), and inhibition of the undesired behavior of biting (*don't bite*). At each training session, the horse was scored for each task, ranging from 0 (not able to perform) to 4 (ideal performance). Tasks taught exclusively based on negative reinforcement (*lead*, *back off* and *whip move*) responded well to training, while training of those behaviors taught by a combination of association with negative reinforcement (*lunging*) or with punishment (*don't bite*) was not effective. Negative reinforcement alone was not enough to maintain the desired behavior once it was performed in *hoof*. No significative improvements were achieved on tasks that were already accepted by all (*brush*) or most (*catch*) of the animals.

Palavras-chave:
Ciência da Equitação
Zooterapia
Pônei

RESUMO

O sucesso e a segurança da Terapia Assistida por Equinos (TAE) dependem do treinamento adequado dos animais envolvidos. Duas treinadoras inexperientes aplicaram, sob supervisão de um treinador experiente, a Teoria do Aprendizado Equino em três cavalos miniatura destinados ao uso em TAE. O protocolo de treinamento aplicado por 6 meses incluiu: colocação do cabresto (*pegar*), aceitação do contato corporal (*escovar*), suspensão dos membros para higiene (*casco*), condução pelo cabresto (*condução*), recuar (*recuar*), aceitação do chicote como uma extensão do braço da treinadora (*chicote*), comandos verbais e corporais para o movimento em círculos (*guia*) e inibição do comportamento indesejado de morder (*não morder*). A cada sessão, cada cavalo recebeu um escore pela realização de cada tarefa, variando entre 0 (não executou) e 4 (desempenho ideal). Tarefas cujo aprendizado dependeu exclusivamente de reforço negativo (*condução*, *recuar* e *chicote*) responderam ao treinamento, ao contrário daquelas que dependeram da combinação de associação com reforço negativo (*guia*) ou com punição (*não morder*). O reforço negativo por si só não foi suficiente para a manutenção do comportamento desejado em *casco*. Nenhuma melhora significativa foi obtida nas tarefas que já eram aceitas por todos (*escovar*) ou pela maioria (*pegar*) dos animais

INTRODUCTION

Human-horse interactions are therapeutically applied to people because of their physical benefits of corporal contact and movement. The natural prey instinct and herd behavior of horses have led them to develop a unique sensibility to body language, allowing them to respond to discrete sensory stimuli, often unnoticed by people. Therefore, horses can also be used in EAT for a psychological approach, helping to develop trust,

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bonding, and nonverbal communication skills (HALLBERG, 2018). Several forms of interaction have been developed in EAT for treatment strategies.

EAT has multidisciplinary features, but equine wellbeing requires that professionals involved should be knowledgeable about equine behavior. Even so, therapy horses are frequently confused and manifest flight behavior, burn out or show signs of depression, possibly due to misinterpretation of animal communication or lack of understanding of Equine Learning Theory (KIESON; ABRAMSON, 2017). So, animal training based on scientific knowledge is crucial to success and safety of EAT.

Equine Learning Theory clarifies mechanisms that lead to long-lasting behavioral changes in horses, incorporating both ethological peculiarities and ethical principles (MCGREEVY; MCLEAN, 2007). Research based on this theory has generally focused on sport horse training efficiency and wellbeing, especially in Equitation Science (STARLING; MCLEAN; MCGREEVY, 2016).

Miniature horses attract attention for their beauty or for being unusual and have vast potential as therapy animals because of their small size, easy transportation and suitability for working indoors. The peculiarities of miniature horses have led many patients and care givers to avoid the multidisciplinary benefits of EAT with these animals because of unfamiliarity and fears. Therefore, this research was performed to allow inexperienced trainers to apply Equine Learning Theory to miniature horses in order to verify its efficacy for future use in EAT.

MATERIAL AND METHODS

Approved by Animal Use Ethics Committee under protocol number 240/2018.

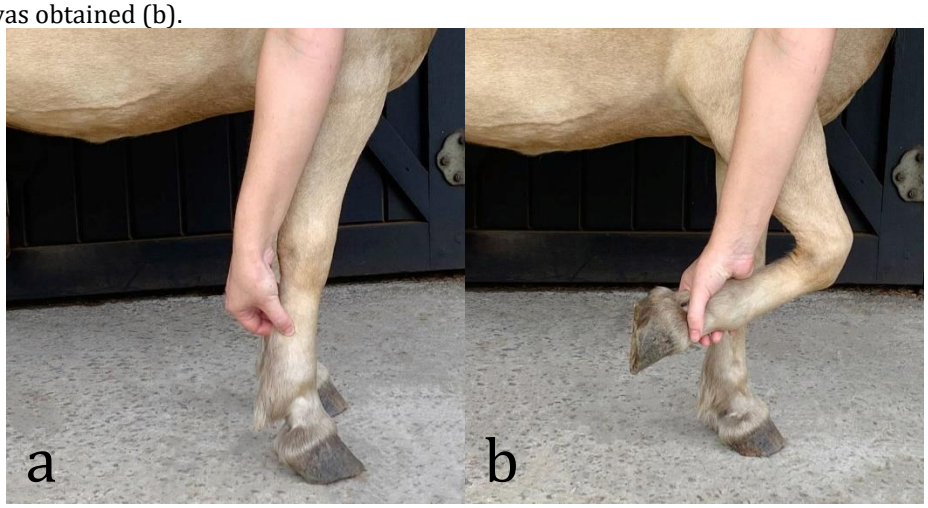
Three miniature horses (an 8-year-old mare, here called "J"; a 2-year-old filly, "P"; and a 2-year-old colt "C") were pasture housed together and trained by two inexperienced trainers as part of an extension project. Both trainers were students of the veterinary medicine course and alternately worked all animals under direction of an experienced horse trainer. The team met every month for training standardization. The following basic protocol was adjusted and applied to each animal according its individual needs.

1. The initial activity of catching of horses from pasture (*catch)* included the acceptance of trainer's approach, placing the halter and petting the animal in the withers. If necessary, food (grain) was shown and only given to the animal after its acceptance of the halter.

2. After *catch*, horses were brushed all over their bodies (*brush*), including face, belly, limbs and tail. Similarly, corporal contact with plastic bags and a whip was done aiming to acclimate the horse to potentially scary objects.

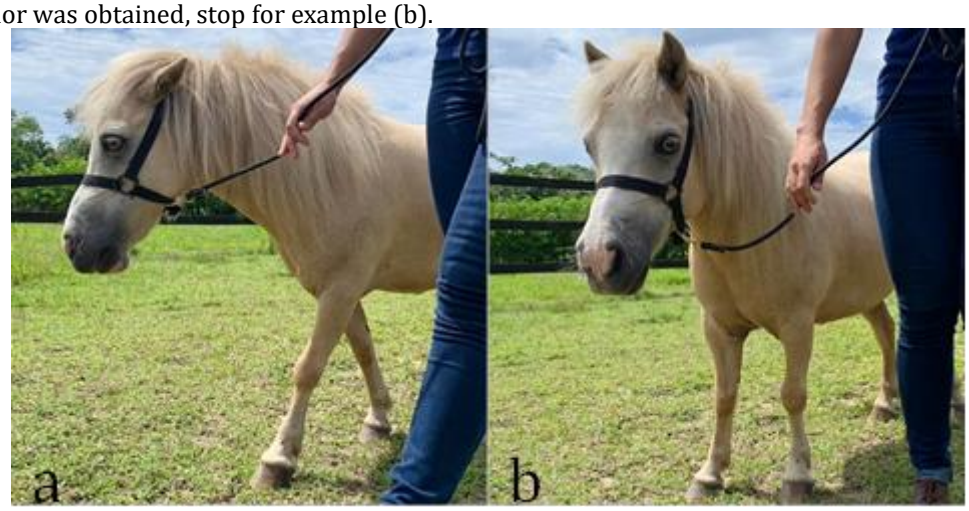
3. For hoof cleaning (*hoof*), the trainer applied progressive manual pressure on horse's flexor tendons until the member flexed (Figure 1a), then all pressure was immediately removed (Figure 1b). The expected result was that the animals allowed hoof cleaning without trying to straighten the limb.

Figure 1. *Hoof* training illustration: pressure was applied to flexor tendons (a) followed by immediate release when the expected behavior was obtained (b).



4. For *lead*, the trainer remained at the left side of the horse holding the halter lead close to the head. Cues were emitted by manual progressive pressure in the desired direction for the horse to walk (Figure 2a). Tension was immediately and completely released when the animal moved as desired (Figure 2b). Directions were: forward, to the right, to the left and stop. This was practiced in different places and situations.

Figure 2. *Lead* training illustration: pressure was applied on the halter's lead (a) and followed by immediate release when the desired behavior was obtained, stop for example (b).



5. *Back off* was taught in a similar way as *lead*. When the animal was standing still, lead pressure was applied towards the horse's chest, encouraging it to step back. The number of steps taken before pressure release was gradually increased as animals progressed in training.

6. *Whip move* was taught for both sides with the trainer positioned facing the animal. Horses were first habituated to the whip contact on their haunches. After the horses stood still, the whip was rubbed against them (Figure 3a). After remaining still without signs of fear or anxiety, the whip was directed towards the hind cannon following the same procedure. When the horses became accustomed to the whip, the *whip move* training took place as follows: front limbs movements were controlled by one of the trainer's hands on the halter lead, while the other applied whip vibration on the horse's cannon. This vibration was increased gradually until the horse took a step sideways with its hind limbs. If it didn't move, or moved towards the whip, vibration was progressively increased (Figure 3b). When the desired behavior was performed, animals were petted and training continued on the other side. Number of steps was also increased as animals progressed in training.

Figure 3. W*hip move* training illustration: the horse was taught to remain calm at whips touch (a). After calmness was achieved, it was taught to step sideways under whip vibration close to its hind cannon. (b).

7. *Lunging* trained the horse to walk around the trainer in a circle at the end of a non-tensioned lunge line (around 4 meters). The walk cue was taught from the verbal command (clear and calm pronunciation of the word "walk"). Then the trainers positioned themselves towards the hindquarters of the horse and raised and arm behind it (Figure 4). When it began to move forward, all pressure was removed. If it didn't move, the whip was then positioned as an arm extension, increasing the psychological pressure. The horse was then asked to accelerate from a walk to a trot using another verbal cue (strong and short pronunciation of the word "trot"), followed by similar raising of the arm or whip whenever necessary. Speed reduction was requested by a whistle combined with the trainer looking away, which was held until the manifestation of desired behavior. Verbal cues were always used first, hoping that the corporal cue would eventually not be needed. Change of direction was requested by simultaneous line tension in the opposite direction of

movement plus body cue from the trainer (arm and body towards the front of the horse). It was expected for the horse to change direction calmly, but without stopping.

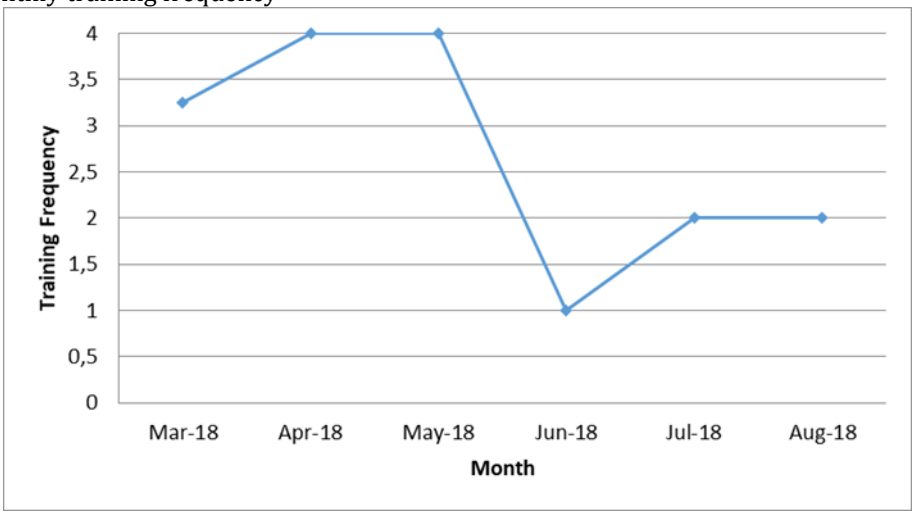
Figure 4. *Lunging* training illustration: horse was requested to move in circles at the end of a non-tensioned lunge line by trainer's positioning towards its hindquarters and raising an arm behind the animal.

8 D*on't bite* training focused on the inhibition of attempts to bite, the single undesired behavior eventually manifested by the two youngest ponies before the beginning of this research. Whenever any animal tried to bite, trainers applied immediate and energic ventral pressure to the halter lead together with the verbal cue "no", pronounced in a short, strong tone; expecting that the verbal cue would be enough to inhibit the behavior at some point.

Verbal communication also occurred whenever necessary to calm the horses, but its effectiveness was only systematically evaluated in *lunging* and *don't bite*.

Training frequencies (Figure 5) fluctuated according to trainer's availability, reaching a maximum of four training sessions in April and May 2018 and a minimum of one session per horse in June 2018.

Figure 5. Average monthly training frequency



In every training session a score (0 to 4) was given for animal's response to each task. Score 4 indicated the manifestation of the ideal expected behavior (prompt and calm response to minimal pressure), and 0 indicated the failure to perform the task. Mixed models were developed for each task in order to test the significance ($p<0,05$) of the fixed effects of training and frequency (operationalized as number of sessions per month) on task scores, considering the individual as the random effect. Additionally, the models examined the influence of other tasks on the independent variables.

RESULTS AND DISCUSSION

Equine species survived for millennia under natural selection as prey, developing a natural neophobia and tendency to manifest flight responses, which are often dangerous to themselves and to humans. When systematic improper management is applied to a horse, it may result in other dangerous behaviors due to the horse's frustration or misinterpretation of cues, such as conflicting behavior (STARLING; et al, 2016). However, horses are able to adapt quickly to social and environmental stimulus, so training can be utilized to suppress their undesired natural behaviors, promote their favorable behaviors and develop new behaviors to allow their utilization in activities such as EAT.

Learning is a process where an individual experience results in a permanent behavioral change. As a process, learning cannot be directly measured (MCGREEVY; MCLEAN, 2007) therefore, the scores given subjectively by trainers at each session reflected previous interactions.

Descriptive analysis of initial scores (Table 1) show that before training began, horses already accepted some management practices such as *catch, brush,* and *hoof*. No

animal was rough enough to receive score of zero in *don't bite*. Greater variations occurred in scores for *lead*, *back off*, *whip move* and *lead*.

Table 1. Descriptive statistics for scores given in each task.

Task	nº	Mean (± σ)	Range
Catch	66	3.59 (±0.78)	1 – 4
Brush	66	3.91 (±0.29)	3 – 4
Hoof	66	3.61 (±0.63)	1 – 4
Lead	66	3.38 (±0.71)	0 – 4
Back off	66	2.45 (±1.30)	0 – 4
Whip move	66	2.37 (±1.11)	0 – 4
Lunging	66	3.42 (±0.82)	0 – 4
Don't bite	66	3.67 (±0.64)	2 – 4

Equine learning theory explains how behavioral changes can be induced by physical and/or psychological practices, including non-associative (habituation) and associative (classical and operant conditioning) learning (MCLEAN; CHRISTENSEN, 2017). Habituation (*brush* and *whip move*), negative reinforcement for immediate responses (*hoof*, *lead*, *whip move* and *lunging*), positive reinforcement for encouraging desired behaviors (*catch*), punishment (by immediate and ventral pressure on halter lead in *don't bite*), and association were applied as described by McLean (2005) as traditional training methods for horses.

The tasks researched are critical for guiding horses by halter and crucial for assuring the safety of children with varying degrees of different disabilities. For learning to be effective, Equine Learning Theory must be applied with special attention to consistency and timing of every trainer's actions (MCGREEVY; MCLEAN, 2007; BARAGLI; PADALINO; TELATIN, 2015). From the perspective of ethics, trainers should also consider equine ethology and cognition, using a distinct sign for each expected behavior and accepting one step at a time for later modeling. Consistency of trainer responses and minimal degrees of arousal are also desirable to avoid and dissociate flight responses (MCLEAN; MCGREEVY, 2015).

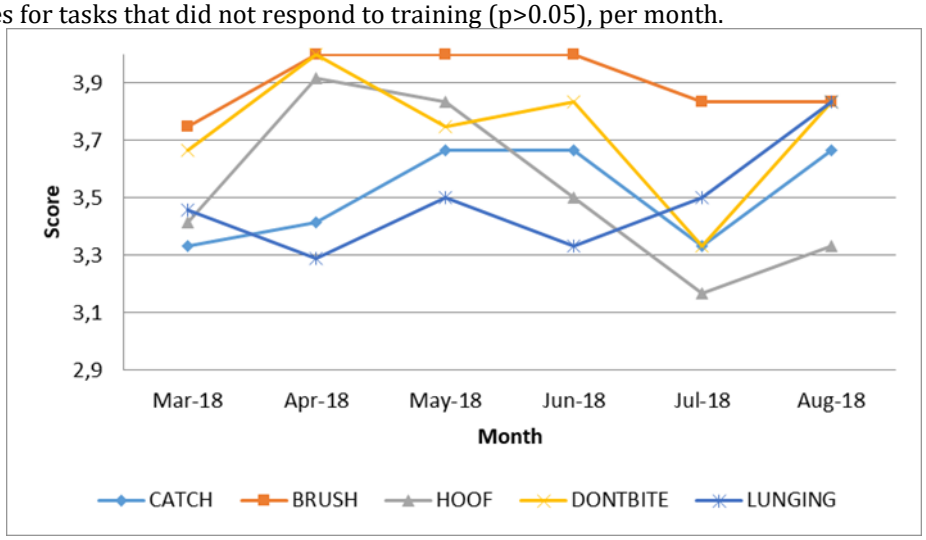
The results of the mixed model analysis are shown in Table 2. Although training and frequency effects were not significant (p>0.05) for *catch*, *hoof* and *don't bite* (Table 2), the lower scores in the month (Jul/18) after the one with the least sessions (Jun/18) can be noted in Figure 6, meaning that further investigation on these tasks is relevant.

Table 2. Significance of fixed effects in mixed model analysis

Task/effect	Training	Frequency	CATCH	HOOF	BRUSH	DONTBITE	LEAD	BACKOFF	WHIPMOVE	LUNGING
Catch	*	*	X	*	*	*	*	*	*	0.05
Brush	*	*	<0.01	*	X		*	*	*	*
Hoof	*	*		X	*	*	*	0.02	*	*
Lead	<0.01	<0.01	*	*	*	*	X	<0.01	<0.01	0.03
Back off	<0.01	0.05	*	0.02	*	*	<0.01	X	0.04	0.02
Whip move	<0.01	*	*	*	*	*	0.02	0.05	X	*
Lunging	*	*	0.03	*	*	*	0.01	0.02	*	X
Don't bite	*	*	0.03	*	*	X		*	*	*

*Not significant; Significant Residual (p<0.0001) in all models; Animal random effect not significant (p>0.05) in all models

Figure 6. Mean scores for tasks that did not respond to training (p>0.05), per month.



Training protocol designated that halter placement (*catch*) was followed by cleaning the horses (*brush* and *hoof*). Habituation was intended in *brush*, part of *hoof* and also in rubbing the whip at their haunches at *whip move*. This type of non-associative learning happens by repeated exposure to a stimulus until the animal realizes that it is unimportant (CHRISTENSEN; RUNDGREN; OLSSON, 2006; HANGGI, 2005; MCGREEVY; MCLEAN, 2007). Such training allows the horse to unconsciously filter non-vital information and to focus on relevant

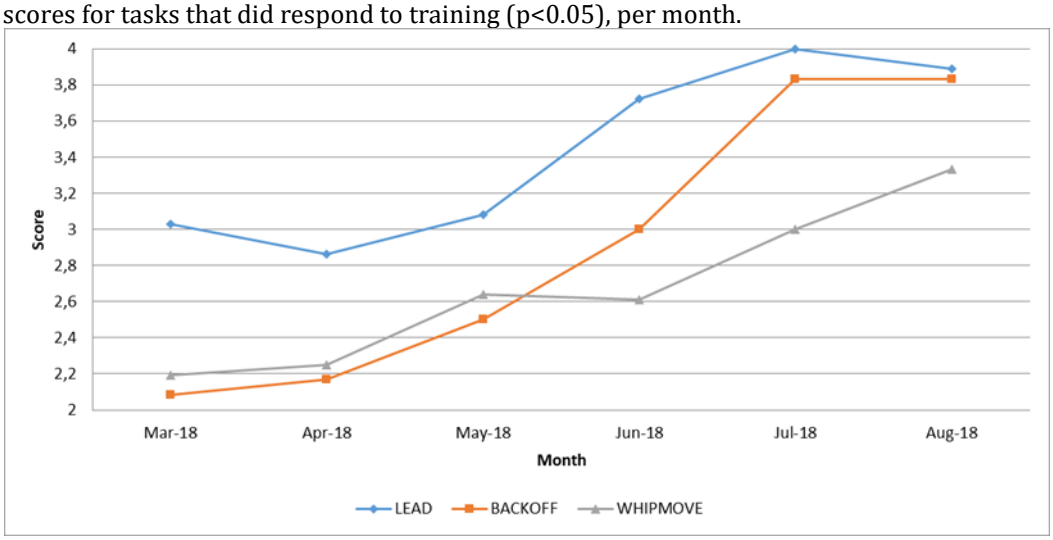
stimulus, like the trainers' cues (HANGGI, 2005). In this research, even though trainers had no previous experience with horses, *brush* was well accepted since the beginning and no score under three was ever given (Figure 6), probably because it was pleasant for them. Thus, no significant improvement occurred ($p>0.05$).

Otherwise, decreasing scores for *hoof* (Figure 6) reflected ponies' inability to maintain relaxation after flexing the limb, due to constant attempts to return to quadrupedal position. Regarding habituation to frightening stimulus, Christensen (2013) stated that the use of negative reinforcement along with habituation in initial exposure improves results in young horses, even though it increases stress responses. In fact, standing in three members can make a horse feel vulnerable and turn *hoof* into a scary situation. Thus, training by habituation alone might not be effective for this species to accept hoof manipulation after limb flexure, and the use of both learning mechanisms (habituation and negative reinforcement) together, as proposed by Christensen (2013) is in fact more suitable for this task.

Negative reinforcement increases the probability of a certain behavior to occur by subtracting a stimulus that is relevant to the animal. Pressuring certain body regions in a horse (stimulus) followed by immediate release after the desired behavior (reinforcement) has been widely studied (BARAGLI; PADALINO; TELATIN, 2015; MCGREEVY; MCLEAN, 2007; MCLEAN; CHRISTENSEN, 2017). When properly used in a horse initial training, negative reinforcement teaches the horse to look for solutions once the pressure begins. When the association between pressure, response, and release of pressure is strongly predictable by the animal, the habit is established (BARAGLI; PADALINO; TELATIN, 2015). However, delays in pressure release may decrease the probability of the desired response by inadvertently punishing it (MCGREEVY; MCLEAN, 2009).

In the case of training ponies, the effectiveness of negative reinforcement was significant ($p<0,05$) for *lead*, *back off* and *whip move* (Table 2). The reinforcement was pressure on the halter's lead by trainers' hands in *lead* and *back off* and by the touch of the whip in *whip move*. Pulling the lead and an immediate (0.5 to 30 seconds) release after the desired movement is the most common way of leading horses, although many horses follow the person holding the loose lead, without visible pressure (WARREN-SMITH et al., 2005). Such refinement in negative reinforcement training was reported by Ahrendt et al. (2015), showing that on the second day of training the amount pressure required to obtain the desired response was reduced. Thus, the desired response to negative reinforcement may be improved with consistency (WARREN-SMITH et al, 2005) and increased time of training (FENNER et al., 2019), explaining the frequency effect in *lead* and *back off*. Agreeing with Fenner et al. (2019), the use of unexperienced trainers did not impair the horses to learn from negative reinforcement. Warren-Smith et al. (2005) reported that longer pressures promoted better results in halter lead training in colts. Similarly, in spite of training not to fear the whip (did not move away from it), the whip's touch in *whip move* imposed greater psychological pressure than trainers' hand in *lead* and *back off*, explaining the continuous improvement in *whip move*, even when frequency of training was reduced (Table 2; Figure 7).

Figure 7. Mean scores for tasks that did respond to training ($p<0.05$), per month.

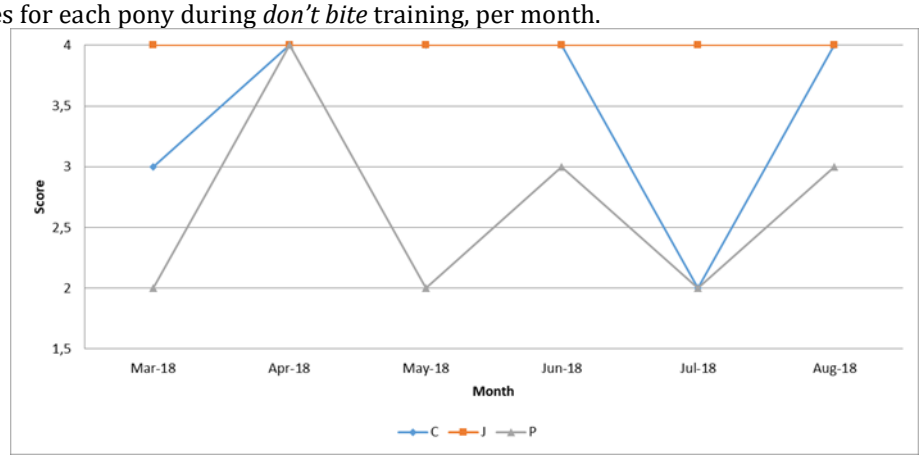


Temperament can be defined as behavioral patterns that appear early in life and are relatively stable in different situations and over time. Fear, response to social isolation, reactivity to humans, sensibility to touch and locomotion level during work affect equine learning in a task-dependent way (LANSADE; SIMON, 2010). A horse may also have an individual tendency to interpret unknown or uncertain situations in an optimistic or pessimistic way, and such cognitive bias may affect learning (KRUEGER; MARR; FARMER, 2017). Temperament was not objectively measured in the ponies of this research, but some individual differences were clearly perceived by trainers, especially in *catch* and *don't bite*.

Play in horses often begins with bites and helps to establish or strengthen social relationships. Horses also use their teethes to mutually groom each other, with social purposes. Animals in closer contact with humans, like foals raised as pets, are more likely to try to assume playing or grooming behavior with people (MCGREEVY, 2012). Likewise, lower scores in *don't bite* were given to the younger horses. The younger horses were generally more friendly to trainers and came to greet them in pasture, which facilitated *catch* and explained its influence over the first one (Table 2). It can be assumed that ponies did not intended any aggression with this undesired but potentially dangerous behavior.

With the aim of adapting training to such individual differences, positive reinforcement with food was used only on the older female for *catch*, as the younger ones did not show any difficulty in this task, and food seemed to worsen behavior in *don't bite*. Thus, a reward in trainers' hand was necessary to *catch* the older female, which was also the only one to eventually be less relaxed in *brush*, receiving score 3, and explaining the influence of *catch* over *brush* (Table 2). Another adaptation to temperament was done by immediate application of downward pressure in halters lead together with the word "no" at every attempt to bite in *don't bite* training, where the combination of two learning mechanisms was intended: punishment and association. This was only necessary in the younger horses (P and C). Though temporary improvements were obtained (Figure 8) for both horses, training effectiveness was not significant ($p>0.05$) due to performance fluctuation.

Figure 8. Mean scores for each pony during *don't bite* training, per month.



Positive punishment consists in the addition of a stimulus after an undesired behavior in order to reduce the probability of reoccurrence. To be effective it must be applied during or immediately after the undesired behavior, so the connection of the behavior to the punishment is clear to the animal. Ideally, it must be used along with a previous secondary reinforcement, such as the word "no", so that eventually the punishment can be withdrawn (MCGREEVY; MCLEAN, 2009). Associative learning happens by classical conditioning, where the animal connects two events over which it has no control (BARAGLI; PADALINO; TELATIN, 2015; MCGREEVY; MCLEAN, 2007). So, a trainer can establish the association of a word (conditioned stimulus) to an event that is important to the animal (unconditioned stimulus). Over time, the horse learns that the first is always accompanied by the second (BARAGLI; PADALINO; TELATIN, 2015). In the case of *don't bite*, the inexperience of the trainers may have induced the early suppression of the punishment, believing that the association of the secondary reinforcement was established for both ponies. This could have caused pony "P" to a worsen performance in May, since it already had a greater tendency to bite from the beginning. Still, the worsening of this behavior in July for "P" and "C" may have happened because of reduced training frequency in June (Figure 5). McGreevy & McLean (2010) stated that trainers' ability is especially important in classic conditioning, because associations are not permanent and must be reestablished periodically.

Lunging consisted in circulating the horse around the trainer at the end of a lung line. The trainers used verbal cues along with varied and subtle body postures to obtain and reinforce acceleration, deceleration or change of direction using negative reinforcement. A complex communication was intended combining two main learning mechanisms: negative reinforcement and association; where verbal cue (conditioned stimulus) was followed by body posture or, if necessary, the whip movement (negative reinforcement and unconditioned stimulus). The working of horses in circles in the round pen (FENNER; MCLEAN; MCGREEVY, 2019; HENSHALL; MCGREEVY, 2014; MULLER; CHRZANOWSKA; PISULA, 2016) or lunging (FENNER; MCLEAN; MCGREEVY, 2019) has been widely described, particularly due to its historical anthropomorphic misinterpretations of equine behavior and its potential to compromise animal welfare (FENNER; MCLEAN; MCGREEVY, 2019; HARTMANN; CHRISTENSEN; MCGREEVY, 2017; MULLER; CHRZANOWSKA; PISULA, 2016). However, once science clarified Equine Learning Theory, lunging may be beneficial to control horses via meaningful signs such as voice and human gestures, extending the repertoire of conditioned responses (FENNER; MCLEAN; MCGREEVY, 2019). So, *lunging* in this study differed considerably

from those practices known to compromise welfare, mainly because ponies were not chased in a threatening way expecting the so called "join up" (HENSHALL; MCGREEVY, 2014; MULLER; CHRZANOWSKA; PISULA, 2016), nor thought to have human feelings (FENNER; MCLEAN; MCGREEVY, 2019; HARTMANN; CHRISTENSEN; MCGREEVY, 2017; MULLER; CHRZANOWSKA; PISULA, 2016). Also, verbal and corporal cues were always used to create calm responses, and when it was not obtained, all pressure was removed allowing the animal to calm down, before a new attempt at the task.

Lunging performance fluctuated in the first months and only reached an ascending line in the last three months (Figure 6), implying that training was not effective ($p>0.05$) in this analysis. However, it was related to other tasks that did respond to training such as *back off* and *whip move* (Table 2). With fluctuations during initial and most frequent training (Figure 5), it is feasible that the complexity of the task along with inexperience of trainers were responsible for lack of significance in training response.

Animals intended for work in Animal Assisted Therapy (AAT), especially EAT, should have good physical and emotional health, and enjoy the activity. They must also be well socialized to humans and trained by humanitarian techniques (FINE, 2015), like Equine Learning Theory which applies scientific knowledge in a horse centered approach (BARAGLI; PADALINO; TELATIN, 2015).

Every horse responds to a stimulus according to its individuality (LANSADE; SIMON, 2010; KRUEGER; MARR; FARMER, 2017). Equine learning ability is task dependent and specific to each horse's learning mechanism. Apparently, this species also doesn't transfer the meaning of similar stimuli to different parts of the body (AHRENDT *et*. al., 2015). Thus, each cue must be trained specifically in the desired situation, requiring time for each animal.

The response to complex and long-term training, involving several learning mechanisms or more than one trainer for the same horse hasn't been documented. Tasks taught only by negative reinforcement (*lead*, *back off* and *whip move*) did respond to training, while on those taught by combination of negative reinforcement or punishment with association such effect was not significant, probably due to trainers' inexperience. However, negative reinforcement alone was not enough to keep the desired behavior after it was achieved in *hoof*. For those tasks that were already accepted by all ponies since the beginning (*brush*), or for most of them (*catch*), significant improvement was not achieved.

Habituation is particularly important in therapy horses because of the neophobic nature of this species. Its effected was not directly evaluated but its use was implicit in all training sessions since a routine of contact to unknown people and equipment was applied. Although learning by habituation is situation-dependent, and the fear is attenuated specifically to the trained situation (LEINER; FENDT, 2011), it doesn't seem to be so with people. Horse-human relationship depends on social and cognitive abilities and is based on repeated interactions that define the expectations of each part in the subsequent meetings (Hausberger et al., 2008). Sankey et al. (2010) showed that a positive interaction of horses to humans increased the voluntary contact of these animals with unknown people over time, which is desired in EAT sessions.

In this research, equine ethology and learning theory were applied to establish predictable and, whenever possible, pleasant interactions; avoiding potentially dangerous reactions like conflicting behavior or flight responses. In general, ponies improved their behavior toward humans, presenting themselves sociable and obedient enough for safe interactions in EAT.

CONCLUSIONS

Professionals involved in EAT must have minimal knowledge about ethology and learning theory to look out for animal welfare and safety of horses and people. This research demonstrates that simple training by negative reinforcement (*lead*, *back off* and *whip move*) of miniature horses is effective when applied by unexperienced trainers if they are aware of Equine Learning Theory. However, complex tasks that involve simultaneous application of negative reinforcement and association (*lunging* and *don't bite*), or those that put the horse in uncomfortable positions (*hoof*) may require greater frequency or a more experienced trainer. The suppression of unwanted biting behavior deserves further research because it endangers people safety and may require withdrawal of non-responsive horses.

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