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RESEARCH ARTICLE

The Efficacy of Clicker Method During Desensitising Horse

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ABSTRACT

Encouraging horses to do tasks willingly during training relating to their welfare is important. Horses are trained for desensitization using de-spooking tracks. In this study, the efficacy of using the clicker method during desensitization to obstacles and novel objects is investigated. Fourteen Arabian horses participated in the study. Their success in completing the tasks, as well as their heart rate and behaviour were examined. The average achievement for the hanging pool noodle door task was significantly higher ($P<0.05$) in the clicker group (100%) than in the control group (43%). Average heart rate is highly significant ($P<0.01$) in the clicker group (139.28 pcs/minute) than the control group (109.42 pcs/minute). In the scope of frightening behaviours, "trot" was determined highly significant ($P<0.01$) in the control group than the clicker group. Clicker training appears to provide an advantage due to its ease of application, low cost, and fast learning by horses. The findings suggest that this method is advisable because of its efficacy during desensitising of horses using the de-spooking track. Fulfilling tasks willingly during training is also important for the horse's welfare and trainer's safety.
Key Words: Behavioural training, clicker method, desensitising, horse, learning theory

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Clicker Yönteminin Atlarda Duyarsızlaştırma Eğitimine Etkisi

ÖZ

Eğitim sırasında verilen görevi kendi istekleriyle yerine getirmeleri, atların refahı ve başarıları açısından oldukça önemlidir. Bu amaçla atların temel eğitimleri sırasında ürkekliklerinin azaltılması ve çeşitli seslere, nesnelere karşı alışmalarının sağlanması için duyarsızlaştırma eğitimlerinde bazı parkurlardan yararlanılmaktadır. Bu araştırmada atların farklı zemin üzerinde yürüme ve nesneler arasından geçme (dar alan, top, şemsiye, halka, branda, yandan engelli kapı ve üstten engelli kapı) gibi bazı görevleri yerine getirmesi sırasında clicker metodunun kullanımının atın parkurdaki başarısına etkisi araştırılmıştır. Bu amaçla 14 baş Arap kısraktan yararlanılmıştır. Atların parkurda görevleri yerine getirme başarıları, kalp atım hızları ve davranışları incelenmiştir. Üstten engelli kapı görevini başarma ortalaması, clicker uygulanan grupta (%100) kontrol grubuna (%43) göre önemli düzeyde ($P<0.05$) yüksek bulunmuştur. Ortalama kalp atım hızı clicker uygulanan grupta (139.28 adet/dk) kontrol grubuna (109.42 adet/dk) göre önemli düzeyde ($P<0.01$) yüksek olmuştur. Kontrol grubunda clicker uygulanan gruba göre; ani durma, süratli veya dörtnala kalkma davranışlarının önemli derecede ($P<0.01$) yüksek olduğu belirlenmiştir. Sonuç olarak, clicker yönteminin atlar tarafından hızla öğrenilen, uygulaması kolay ve maliyeti düşük bir yöntem olması ve aynı zamanda görevlerin başarılmasındaki etkinliği nedeniyle at eğitiminde kullanılması tavsiye edilebilir. Bununla birlikte, clicker metodu kullanılarak atın görevleri kendi isteğiyle yerine getirmesinin hem antrenörün güvenliği hem de hayvan refahı açısından önemli olduğu söylenebilir.
Anahtar Kelimeler: At, clicker metodu, davranış temelli eğitim, duyarsızlaştırma, öğrenme teorisi

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INTRODUCTION

Today, horses used for sports are expected to perform very different movements and tasks. Horses learn these behaviors through training. At the end of a proper and effective training process, horses can successfully sustain the effective behaviors learned for many years. However, if the relationship between horse and human is formed as a result of pressure and is not based on mutual trust, the horse may not feel safe and may exhibit some instinctive behaviors such as running away, resisting and fighting. This situation may endanger the safety of horse specialists (farrier, trainer, veterinarian, rider, etc.) and can also lead the loss of horses through injury or behavioural problems. For these reasons, behavior-based training methods based on learning theory are recommended.

Learning becomes more effective with the development of techniques in the field of animal training. The training process itself becomes more efficient through the application of learning theory, which is rooted in the psychology, of animal behaviour (Breland and Breland 1951, 1966, Skinner 1938, 1951). Training processes are based on communication between the trainer and the animal.

Learning can be defined as a process of adaptive changes in individual behaviour as a result of experience (Thorpe 1963). Learning theory is non-associative learning, which includes habituation and sensitisation processes, and associative learning, which includes classical and operant conditioning processes. One of the main learning processes involved in the training of horses involves operant conditioning, also known as instrumental learning (McLean and Christensen 2017). The use of positive reinforcers within the scope of learning theory gives favourable results in horse training. Clicker training, in which positive reinforcers are used, started to be preferred in the 1990s and continues to be popular today (Kurland 2001). Various forms of clicker training have been used to teach a variety of tasks to horses (Flannery 1997, Ferguson and Rosales-Ruiz 2001, Williams et al. 2004).

Skinner's theory of operant conditioning (1938) proposes that animals learn to "operate" their world based on the consequences of their behaviours. According to this theory, behaviors followed immediately by a desirable consequence (reinforcement) become more likely to occur again, while behaviors followed immediately by an undesirable consequence (punishment) become less likely to occur. In behavior-based training, the animal is taught step by step to exhibit a certain behaviour in response to a specific stimulus. During the operant conditioning process, the trainer provides the desired response to the animal by making a "click" sound or by giving an auditory stimulus with a specific word after the hores exhibits the desired behaviour (Skinner 1951, Pryor 2005).

With the clicker method, the trainer gives the animal a reinforcement with rewarding words or food after the auditory stimulus. In this way, the animal learns which behaviour is rewarded through trial and error. In the shaping procedures, the aim is to teach complex tasks by dividing them into parts; in this way, complex actions can be simplified (Lindsay 2000). Training can become more effective in a short time with the use of the clicker method. It is reported by Pryor (1999) that the use of the clicker method in the training of animals speeds up the learning of new tasks. Pryor explains this effect of training with three mechanisms. First, the clicker acts on the initially neutral stimulus, pairing with the repeated primary reinforcer, as a conditional and secondary reinforcer. Second, the clicker acts as a marking signal by enabling the animal to distinguish a particular behaviour by reaching the primary reinforcer as a result of an event. Finally, the clicker acts as a bridge between behaviour and primary reinforcer, indicating that the primary reinforcer will come (Pryor 1999, Pryor 2005, Skinner 1938, Williams 1994). The potential of the clicker stimulus to improve animal learning may not only increase the rate of behaviour acquisition but also reduce animal frustration and further enhance the relationship between trainer and animal (Bartlett 2010, Lindsay and Wood 2007, Bornhede 2010, Ferguson and Rosales-Ruiz 2001, Danışan and Özbeyaz 2021). Today, the clicker method is successfully applied in the training of many animal species such as dogs (Lindsay and Wood 2007, D'Onofrio 2015), pigs (Paredes-Ramos et al. 2020) mice (Leidinger et al. 2017), goats (Langbein et al. 2007) and horses (Danışan and Özbeyaz 2021).

Desensitization is studied under non-associative learning. Four main Desensitization techniques can be derived from the applied animal behaviour literature: systematic Desensitization, counter-conditioning, overshadowing; and response prevention (McLean 2008, Mills et al. 2010). Systematic Desensitization technique is used in the modification of some behaviors in horses to prevent behavioural problems. Within the scope of the training, a stimulus is given to the horse, which gradually increases. The horse is rewarded for giving the desired response to the stimulus and the stimulus level is increased. With this technique, the response threshold is increased gradually (McLean and Christensen 2017). For example, police horses are often systematically desensitised to noise, smoke, flags, rapidly advancing people and objects. Also, therapy horses can be desensitised to objects, peoples behaviour patterns and some therapathic games etc.

In this study, horses were passed through the de-spooking track which was prepared for desensitization training by using the clicker method. The effect of using this method on the success of the horse on the track was investigated while it performed tasks such as passing over novel grounds

and between static novel objects (road cones, ball, umbrella, ring, tarp, and lateral and hanging pool noodle doors).

MATERIAL and METHODS

Animals

The animal material of the research consisted of 14 Arabian mares (4-24 years old) bred in the Mahmudiye district of Eskişehir province in Turkey. This study was carried out in December 2016.

Study Design

The horses (n=14) were divided into the clicker group (n=7) and the control group (n=7). Desensitization training was used twice for all horses in the clicker groups (clicker1 and clicker 2) and the control groups (control 1 and control 2). There were in seven static novel objects (road cones, ball, umbrella, ring, tarp, laterally pool noodle door, hanging pool noodle door) on the de-spooking track in the test arena. Horses passed over or between the objects.

The horses in the control group were given an audible stimulus to walk with the trainer. If they did not walk, negative reinforcement was applied via pressure to the halter. The horses in the clicker group were given an audible stimulus and used a target stick to walk with the trainer. The target stick were introduced to the horses and within three seconds after the horses touched the stick, the "click" sound was made with the help of a clicker device. A small pieces of carrot was given to the horses as a positive reinforcement.

The horses' behaviour and heart rate were recorded by a Polar Equine M400 device, which was fastened to the left side of the horse just behind the front leg with an elastic girth. Horses were recorded on video using a Go-Pro Action Camera when they do tasks.

The behavioural responses of the horses were evaluated using an equine ethogram (Table 1) within the scope of curiosity, fright and threat behaviours. The types of behaviour included were: alert, nibble, sniffing/licking (curiosity behaviours); snort, neigh, head high, balk, vigilance, trot (fright behaviours); ear laid back, paw, stomp, kick (threat behaviours). The data on the behavioural and physiological responses of the horses were obtained only in their first trial on the de-spooking track. In both groups, ethological analyses were made according to whether seven horses showed behaviors in with seven different novel objects (7x7=49 behaviour).

In statistical analysis, differences between the groups in terms of accomplishing tasks and behaviors were analysed with the Chi-square method, and differences between the groups in terms of heart rate were analysed with the t-test. SPSS 14.01 (license number: 9869364) package program was used for statistical analysis (Anonymous 2022).

RESULTS

Comparison of the success rate for the tasks on the de-spooking track between control-1, control-2, clicker-1 and clicker-2 groups are given in Table 2. In all groups, the success rate of navigating narrow spaces (with road cones), ball, umbrella and lateral pool noodle door tasks was 100%. While the success rate of the ring task was 71% in the control-1 group and the clicker-1 group, it was 100% in the control-2 group and the clicker-2 group. In the control-1, control-2, clicker-1 and clicker-2 groups, the success rate of the walking on the tarp task was determined as 43%, 71%, 71% and 100%, respectively. In the hanging pool noodle door task, the rate of accomplishing the task was found as 43%, 57%, 100% and 100% in the control-1, control-2, clicker-1 and clicker-2 group, respectively. Average heart rate was 139.28 pcs/minute in the clicker group and 109.42 pcs/minute in the control group.

Results on curiosity, fright and threat behaviors are given in Table 3. From curiosity behaviours; alert, sniffing/licking and nibble behaviors were 0%, 6%; 55%, 45% and 41%, 45% in control-1 and clicker-1 groups respectively. Sniffing/licking behaviors were not observed in both groups. From fright behaviours; snort, neigh (vocalisation), head high, balk, vigilance and trot behaviors were 24%, 14%; 2%, 0%; 16%, 16%; 35%, 8%; 12%, 8% and 35%, 8% in control-1 and clicker-1 groups respectively. From threat behaviours, the ears laid back (pinned) was 14% and 10% in control-1 and clicker-1 groups respectively. Paw was 2% in the control-1 group and stomp and kick behaviour were not observed in both groups.

Table 1. Behaviors evaluated within the scope of the research

Behaviour		Description
Curiosity Behaviour	Alert	Rigid stance with the neck elevated and the head oriented toward the object or animal of focus. The ears are held stiffly upright and forward and the nostrils may be slightly dilated. (McDonnell and Haviland 1995).
	Nibble	With jaws closed the upper lip is moved upward and downward against an object, typically without dental contact of the object. Comments: Nibbling of an object is typically one of the first play responses associated with an investigative approach of the object (McDonnell and Poulin 2002).
	Sniffing/Licking	Sniffing and/or licking an inanimate object may be as if to investigate the odor, texture, shape, taste, and size of an object. Sniffing and licking of a herd mate sometimes precedes and appears to initiate mutual grooming (Keiper 1985).
Fright Behaviour	Snort	Short explosive exhalations from nostrils (Boyd and Houpt 1994).
	Neigh (Vocalisation)	A high amplitude call of long duration that fluctuates in frequency and is given on expiration (Boyd and Houpt 1994).
	Head high	Nose above the withers (Hall et al. 2014).
	Balk	Stopping suddenly while walking (McGreevy et al. 2009).
	Vigilance	Standing still with elevated neck, intently orientated head and ears (Le Scolan et al. 1997).
	Trot	A two-beat gait (Seaman et al. 2002).
Threat Behaviour	Ears laid back	Ears pressed caudally against the head and neck (McDonnell and Haviland 1995).
	Paw	Striking a vertical or horizontal surface, or the air with a forelimb (Seaman et al. 2002).
	Stomp	One foreleg is raised and lowered, sharply and firmly striking the ground, usually repeatedly (McDonnell and Haviland 1995).
	Kick	One or both hind legs lift off the ground and rapidly extend backwards toward another stallion, with apparent intent to make contact (McDonnell and Haviland 1995).

Road cones

Umbrella

Ball

Ring

Tarp

Lateral pool noodle door

Hanging pool noodle door

Figure 1: Study Design

Table 2. Comparison of task success rates in groups

Groups	Road cones			Ball			Umbrella			Ring			Tarp			Laterally pool noodle door			Hanging pool noodle door		
	Passed	Not passed	%	Passed	Not passed	%	Passed	Not passed	%	Passed	Not passed	%	Passed	Not passed	%	Passed	Not passed	%	Passed	Not passed	%
Control 1	7	0	100	7	0	100	7	0	100	5	2	71	3	4	43	7	0	100	3	4	43
Control 2	7	0	100	7	0	100	7	0	100	7	0	100	5	2	71	7	0	100	4	3	57
P			-			-			-			-			-			-			-
Clicker 1	7	0	100	7	0	100	7	0	100	5	2	71	5	2	71	7	0	100	7	0	100
Clicker 2	7	0	100	7	0	100	7	0	100	7	0	100	7	0	100	7	0	100	7	0	100
P			-			-			-			-			-			-			-
Control 1	7	0	100	7	0	100	7	0	100	5	2	71	3	4	43	7	0	100	3	4	43
Clicker 1	7	0	100	7	0	100	7	0	100	5	2	71	5	2	71	7	0	100	7	0	100
P			-			-			-			-			-			-			*
Control 2	7	0	100	7	0	100	7	0	100	7	0	100	5	2	71	7	0	100	4	3	57
Clicker 2	7	0	100	7	0	100	7	0	100	7	0	100	7	0	100	7	0	100	7	0	100
P			-			-			-			-			-			-			-

*: Significant (P<0.05), -: Insignificant

Table 3. Comparison between behaviors in the de-spooking track (7 horses x 7 novel objects = 49 behaviors were evaluated in each group)

	Curiosity Behaviours											
Groups	**Alert**			**Sniffing**			**Touching**			**Licking-Nibbling**		
	Did	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**
Control 1	0	49	0	27	22	55	20	29	41	0	49	0
Clicker 1	3	46	6	22	27	45	22	27	45	0	49	0
P			-			-			-			-

	Fright Behaviours																	
Groups	**Snort**			**Neigh**			**Head high**			**Balk**			**Step back-sideways**			**Trot-Gallop**		
	Did	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**
Control 1	12	37	24	1	48	2	8	41	16	17	32	35	6	43	12	17	32	35
Clicker 1	7	42	14	0	49	0	8	41	16	4	45	8	4	45	8	4	45	8
P			-			-			-			**			-			**

	Threat Behaviours								
Groups	**Ears laid back**			**Stomp**			**Paw-Kick**		
	Did	**Did not**	**%**	**Did**	**Did not**	**%**	**Did**	**Did not**	**%**
Control 1	7	42	14	1	48	2	0	49	0
Clicker 1	5	44	10	0	49	0	0	49	0
P			-			-			-

**: Significant (P<0.01), -: Insignificant

DISCUSSION

In this study, when the findings in Table 2 are evaluated in general, it can be seen that the second trials are more successful than the first ones and the clicker groups are more successful than the control groups. In the second trial of the clicker group, it was determined that all horses were successful in all tasks. This situation shows that the horses' success rate for the tasks is higher on a known track than on a track encountered for the first time. In addition, it can be said that the clicker method increases the success rate of the horses in achieving the tasks.

Negative reinforcement, a traditional method, is widely used in horse training. However, there has been an increase in the use of positive reinforcement in recent years. In positive reinforcement studies related to the loading of horses onto a trailer; it has been reported that positive reinforcement shortens the loading time and reduces associated stress. Thus, it is effective in eliminating negative behaviors during loading (Ferguson and Rosales-Ruiz 2001, Dai et al. 2019, Hendriksena et al. 2011). Sankey et al. (2010) state that horses trained with positive reinforcement also show more positive behaviors in their subsequent relationships with people. In training studies on horses, it has been reported that positive reinforcement supports learning by motivating horses' behaviour (Hockenhulla and Creighton 2013), increases the welfare of horses (Bornhede 2010), is a safer method because it increases the welfare of horses (Slater and Dymond 2011), they have exhibit less frightened and threatening behaviors (Danışan and Özbeyaz 2021) and they are more willing to participate in training (Innes and McBride 2008). Freymond et al. (2014) also report that in horses they trained for various exercises, negative reinforcement groups were more nervous and experienced more negative emotions than with positive reinforcement. Similarly, in this study, pausing and trotting behaviors resulting from fear behaviors were found to be significantly higher ($P<0.01$) in the control group than in the clicker group. Reducing fear and threat behaviors with the use of positive reinforcement will make training easier and safer for both the rider and the horse.

The clicker method, which is applied as a secondary reinforcer in positive reinforcement, has been applied in different animal species and in the fulfillment of different tasks in recent years. Lindsay and Wood (2007) report in their study on dogs that the clicker method reduces training time and food supplements required to learn the behaviour. Similarly, D'Onofrio (2015) states in his study that the clicker is an effective method in dog training. On the other hand, Smith and Davis (2008) state in their study that there was no difference between clicker and the control groups in terms of learning the behaviour, but the clicker group forgot the learned behaviour later than others. Paredes-Ramos et al. (2020) report that the clicker method reduces the number of repetitions required to learn to bring an object among piglets and enables faster learning. Leidinger et al. (2017) states that mice trained with the clicker method learn quickly and perform all tasks successfully. Langbein et al. (2007) states that the clicker method facilitates learning in goats, with the animals being more willing to fulfill the task and performing the task in a shorter time and with fewer trials, and with the incidence of abnormal behaviour reduced. These findings show that the clicker method can be used effectively in different species and different tasks.

There are so far few clicker studies in horses. Bartlett (2010) reports that clicker training provides a basis for creating a positive partnership between the trainer and the horse to take by encouraging an active role in the learning process. Flannery (1997) states in his study that the rate of performing the tasks correctly was higher in the clicker group. Danışan and Özbeyaz (2021) who compared three different training methods in horses in their study, found that obedience behaviour and the rate of success in the task were higher and startle-threat behaviors were lower with the clicker method. McCall and Burgin (2002) and Williams et al. (2004) reported in their study on horses that the clicker method did not reduce training time compared with using only food as a primary reinforcer, and there was no difference between the groups in terms of the forgetting time of the behaviour. However, McCall and Burgin (2002) state that horses that have received secondary reinforcement in the past respond more accurately than other horses in a new training. In this study, we determined that the rate of achievement of the tasks was higher in the clicker group. In the second trial of the clicker group, it was determined that all horses were successful in all tasks. In addition, fear behaviors were found to be significantly higher in the control group than in the clicker group. These findings, suggest that the clicker method increases the welfare of horses by reducing negative emotions and increases the success rate of tasks.

Some trainers are discouraged from using food rewards in training programmes based on positive reinforcement because of concerns that hand feeding will lead to undesirable oral exploratory behaviour (Waran et al. 2002, Hart 2008). Hockenhulla and Creighton (2010) report in their study that there was no relationship between clicker training and undesirable oral behaviour of horses, and that the risk factors for these behaviors may have arisen from outside this practice. In our study, there was no finding that food-based positive reinforcement was associated with undesirable oral behaviors in horses. These findings suggest that horse owners should not be discouraged from using food-based positive reinforcement techniques with their horses.

From their training study in horses, Sankey et al. (2010) report that the mean heart rate in the negative reinforcement group was higher than the positive reinforcement group. Innes and McBride (2008) determined that the heart rate of horses that were given positive reinforcement in the later stages of the trial was significantly higher than that of horses given negative reinforcement. In the study, the increase in heart rate was associated with increased adrenaline/noradrenaline release during training in anticipation of food reward, as horses in the positive reinforcer group appeared to be highly motivated to the task. Similarly, in this study, the average heart rate was found to be significantly higher ($P<0.01$) in the clicker group (139.28 pcs/minute) than the control group (109.42 pcs/minute). This may be because of the food reward excites the horses.

CONCLUSION

It is seen that training based on learning theory is more efficient for horses. It has been observed that horses voluntarily fulfill tasks thanks to the positive reinforcements used in operant conditioning processes. This reduces the frequency of behavioural responses related to fright and threat in horses, thus minimising risks in management and training.
As a result, clicker training provides an advantage in desensitization training of horses due to its ease of application, low cost, and fast learning by horses. Research findings show that this method is advisable due to its effectiveness during the desensitization of horses on the de-spooking track.

Conflict of interest: The authors declared that there is no conflict of interest.

Ethical Approval: This study is not subject to the permission of HADYEK in accordance with the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees" 8 (k).
The data, information and documents presented in this article were obtained within the framework of academic and ethical rules.

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Authors Contribution Rate: The authors declare that they have contributed equally to the article.

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