Can satisfaction of the rider be predicted from a behavioural test of horses?

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It may be assumed that the satisfaction from horse riding ultimately results in positive feelings for the mount and stimulates motivation for supplying high standards of welfare to the horse. The aim of the present study was to assess the usefulness of a simple behavioural test enabling the differentiation of horses in terms of their potential to be satisfying mounts. Seventeen leisure horses were subjects of behavioural tests and a test ride.

The tests comprised leading the horse in hand and riding through a 30-m path containing in its middle novel objects: a coloured carton (C) on the side or a blanket (B) on the ground. Test riders were surveyed to rate their satisfaction from the ride, general feelings for the horse, its sensitivity to the rider's seat and hands, focus on the rider and on the surroundings, as well the perceived safety and obedience of the horse.

The more time a given horse needed to cross the path, the less satisfaction and less positive feelings were declared by riders after a test ride. Responsiveness to hands, seat and the focus on the rider were highly predictive of rider's satisfaction, as well as obedience during the ride in trot and canter. Similarly, the perception of safety in walk, trot and canter was an important factor of satisfaction. For testing the differences in behavioural characteristics which contribute to a satisfactory and safe use of horses, we propose CB tests for preliminary appraisal of horses designated for recreational pursuits.

KEY WORDS: behavioural test / equitation / horse / rider / satisfaction

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Horse riding is an activity that involves professional sporting as well as participation in amateur competitions and leisure pursuits. The latter one encompasses the highest number of participants among all equitation disciplines [Górecka-Bruzda *et al.* 2010, Mills and McNicholas 2005, Poncet *et al.* 2007, Keaveney 2008, Hennessy *et al.* 2008]. As in all human activities undertaken as a hobby or a profession, riders seek satisfaction from the relationship with an animal and riding itself. It has been documented that owners declare "pleasure" from having a horse as a main reason for buying and riding it [Mills and McNicholas 2005, Heydemann and Grosbois 2006a, Heydemann and Grosbois 2006b].

Obviously, the personality and riding skills of the rider play an important role in the cooperation between both parties of the pair [Hausberger *et al.* 2008, Wolframm and Micklewright 2008a,b], but identification and assessment of specific characteristics of the horse that contribute to the satisfaction of the rider would be helpful in the selection and training of horses to be used in riding centres. Equitation attracts a population of riders who pay special attention to particular features of their mounts [Górecka-Bruzda *et al.* 2011]. Hitherto, responsiveness to riders' aids, i.e. to specific actions of his/her hands and seat, were studied to measure its relationship with some temperamental traits of the horse [Visser *et al.* 2003, Visser *et al.* 2008]. Proposed characteristics related to sensitivity to reins and the rider's seat, as well as the ability to focus on the rider describe well horse-related features crucial to good horse-rider communication. Those features directly contribute to rideability, the trait of a horse that is very important to riders and is one of characteristics under assessment in breeding selection [Koenen *et al.* 2004, Górecka-Bruzda *et al.* 2010]. Thus, it is reasonable to consider them in measuring rider's satisfaction from the ride.

Equitation is an activity characterised by a high injury rate [Jaggin *et al.* 2005, Jagodzinski and DeMuri 2005]. In our previous study we found that mental properties of horses predisposing them to unsafe behaviour, as perceived by riders, could be predicted when subjecting horses to standard reactivity tests in their home boxes [Górecka-Bruzda *et al.* 2015]. The development of a simple, feasible behavioural test that could be used in the assessment of the features contributing to riders' satisfaction from the ride would be extremely useful in preliminary selection to riding centres. It may be assumed that satisfaction from the ride will ultimately result in highly positive feelings for the mount and will stimulate a motivation for supplying high standards of welfare to the horse.

Behavioural tests are tools used successfully for a standardised assessment of personality of horses in Switzerland [Burger *et al.* 2007] and France [http://www.haras-nationaux.fr/information/accueil-equipaedia/comportement-ethologie/appreciation-du-comportement-et-du-temperament/tests-de-temperament.html]. The aim of the present study was to assess applicability of a simple behavioural test to differentiate horses in terms of their potential to be satisfying mounts.

Material and methods

Animals

Seventeen leisure horses (9 geldings, 8 mares; mean age 8 years old) used for equitation at the Academic Riding Club of the University of Warmia and Mazury, Olsztyn, Poland, were subjects of the behavioural test and a test ride (Tab. 1). The experiments were approved by the local Commission for Ethics in Animal Experimentation, the University of Warmia and Mazury in Olsztyn, Poland. This study is a part of a larger project on horse riding and the same animals participated in our previous experiment [Górecka-Bruzda et al. 2015].

Table 1. Description of horses according to their sex and breed

Name of the horse	Sex	Breed
Akapit	gelding	Silesian
Akcent	gelding	Polish Halfbred Horse
Big Bend	gelding	Silesian
Bojar	gelding	Sport pony
Brokat	gelding	Polish Halfbred Horse
Coral	mare	Polish Halfbred Horse
Darling	mare	Thoroughbred
Figaro	gelding	Polish Halfbred Horse
Gejsza	mare	Polish Coldblood Horse (mix)
Gruzja	mare	Polish Halfbred Horse
Korab	gelding	Polish Halfbred Horse
Korsyka	mare	Wielkopolska
Magia	mare	Sport pony
Moba	mare	Mur-insulan x Arabian Purebred
Playgirl	mare	Polish Halfbred Horse
Precedens	gelding	Polish Halfbred Horse
Togo Torino	gelding	Fjord

Carton and blanket tests (CB tests)

Unexpected and novel situations may be successfully used in testing manageability of horses. To standardise conditions of such a trial, a simple arrangement of the familiar riding arena was made.

The tests comprised leading the horse in hand through a 30-m path located along the arena wall and containing in its middle novel objects: a coloured carton (0.5 x 0.5 x 0.5 m) on its side (2 m from the arena wall) and a blanket on the ground (Fig. 1). The experimenter led the horse twice through the whole length of the path, turning back after the first run. The carton and blanket in-hand tests (CT-IH; BT-IH) were spread over two days and the order of C or B testing as the first object was semi-random. The time to cross the path twice was measured for each test.
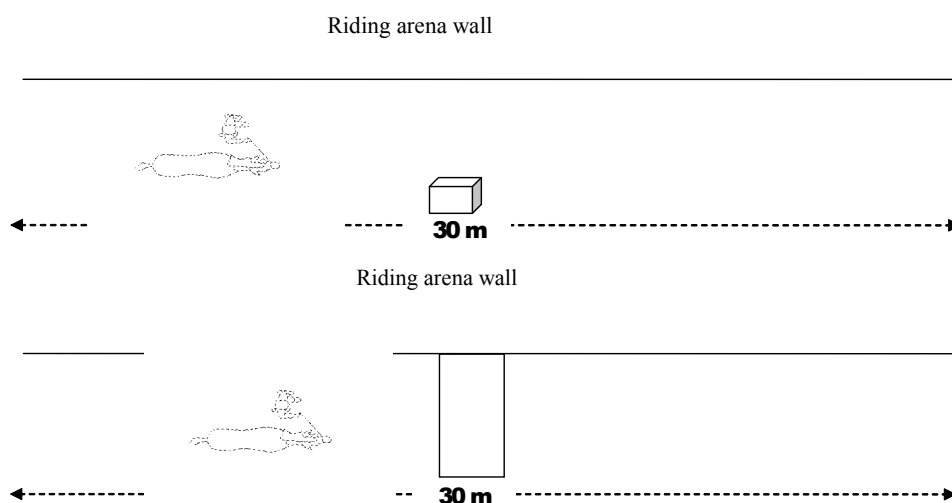
Fig. 1. Schematic representation of experimental set-up in carton (C) and blanket (B) tests.

Test ride and survey of riders

The riders were students of the Faculty of Animal Bioengineering Faculty, the University of Warmia and Mazury, Olsztyn, Poland. They had basic riding skills (they could effectively manage the horse in walk, trot and canter). They were volunteers and their participation in the present project was connected with their specialisation in horse using and breeding and involved their normal activity at the Academic Riding Club.

Test rides started in the week following the CB tests and were spread over one month. Three horses were ridden together by three experienced riders (all females). Before the ride, the riders were asked to prepare the horses for the ride in the standard way (brushing, bridling and saddling), then to lead them to the riding arena and mount them. The ride lasted about 50 minutes and involved crossing the path with the carton and the blanket in walk and trot. The objects were placed identically as in the hand-led test. Similarly to the hand-led test, the order to cross the path with either the carton or the novel surface as the first to cross was semi-random. The time to cross the path in walk (CT-walk, BT-walk) and trot (CT-trot, BT- trot) was measured (Tab. 2). The riders were also asked to ride in canter, but without crossing the path. The ride was supervised by an instructor (EJ). The level of exercises was similar for all riders and all horses.

After the ride the riders were surveyed to score the perceived safety, the obedience of the horse when preparing it for the ride (when brushing, saddling and leading) and during the ride (when mounting the horse, in walk, trot and canter, Tab. 2). Moreover, they were asked to score the horse's sensitivity to the rider's seat (SEAT), responsiveness to the action of the rider's hands (HAND), the focus of the horse on

Table 2. Variables measured in carton and blanket test and rider survey

Variable	Description
Carton tests (CT)	
CT-IH	Time to cross the runway with a novel carton in-hand (seconds)
CT-WALK	Time to cross the runway with a novel carton when ridden in walk (seconds)
CT-TROT	Time to cross the runway with a novel carton when ridden in trot (seconds)
Blanket test (BT)	
BT-IH	Time to cross the runway with a blanket in-hand (seconds)
BT-WALK	Time to cross the runway with a blanket when ridden in walk (seconds)
BT-TROT	Time to cross the runway with a blanket when ridden in trot (seconds)
Rider survey	Obedience of the horse
OBED-brush	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
OBED-saddle	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
OBED-lead	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
OBED-mount	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
OBED-walk	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
OBED-trot	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
OBED-canter	Was the horse: disobedient (0); rather disobedient (1); rather obedient (2); obedient (3)
Rider survey	Perceived safety of the horse
SEC-brush	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
SEC-saddle	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
SEC-lead	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
SEC-mount	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
SEC-walk	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
SEC-trot	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
SEC-canter	You felt: completely insecure (0); for most of the time insecure (1); for most of the time secure (2); completely secure (3)
Rider survey	Responsiveness of the horse and the focus*
SEAT*	Was the horse: completely unresponsive to the seat (0); rather unresponsive to the seat (1); rather responsive to the seat (2); responsive to the seat (3)
HAND*	Was the horse: completely unresponsive to hands (0); rather unresponsive to hands (1); rather responsive to hands (2); responsive to hands (3)
FOCRIDER*	Was the horse: not focused on the rider (0); not focused on the rider for most of the time (1), focused on the rider for most of the time (2); focused on the rider (3)
FOCSURR*	Was the horse: not focused on the surroundings (0); not focused on the surroundings for most of the time (1), focused on the surroundings for most of the time (2); focused on the surroundings (3)
Rider survey	Satisfaction from the ride and general feelings for the horse
SATISF	Was the ride: completely unsatisfying (0); rather unsatisfying (1); rather satisfying (2) completely satisfying (3)
FEELINGS	You feel: you dislike this horse (0); you rather dislike this horse (1); you rather like this horse (2); you like this horse very much (3)

*Adapted from Visser *et al*. [2003].

the rider (FOCRIDER) and the surroundings (FOCSURR), (adopted from Visser *et al.* 2003; Tab. 2). Finally, they rated their satisfaction from the ride and their general feelings for the horse (Tab. 2).

The analyses included calculation of descriptive statistics of measured variables and Spearman rank correlations between the variables measured in behavioural tests and in riders' survey (averaged for three riders).

Results and discussion

The descriptive statistics of variables measured in the CB test are given in Table 3. The horses showed individual responses to presented stimuli, as represented by high

Table 3. Descriptive statistics of variables measured in carton and blanket tests and rider survey

Variable	Mean (standard deviation)	Median [minimum; maximum]
Carton tests		
CT-IH (s)	44.7 (4.5)	45 [38; 59]
CT-WALK (s)	37.1 (2.6)	37 [33; 44]
CT-TROT (s)	18.8 (1.9)	19 [16; 22]
Blanket test		
BT-IH (s)	59.4 (17.3)	49 [46; 110]
BT-WALK (s)	50.0 (15.1)	47 [39; 104]
BT-TROT (s)	23.6 (4.2)	23 [18; 31]
Rider survey		
OBED-brush (score)	2.6 (0.4)	2.7 [1.7; 3]
OBED-saddle (score)	2.6 (0.5)	3 [0.3; 3]
OBED-lead (score)	2.7 (0.3)	3 [2.3; 3]
OBED-mount (score)	2.6 (0.3)	2.3 [2; 3]
OBED-walk (score)	2.5 (0.3)	2.7 [1.7; 3]
OBED-trot (score)	2.4 (0.5)	2 [1; 2.7]
OBED-canter (score)	2.3 (0.6)	2 [1; 2.5]
Rider survey		
SEC-brush (score)	2.6 (0.4)	2.7 [1.7; 3]
SEC-saddle (score)	2.6 (0.7)	3 [1; 3]
SEC-lead (score)	2.8 (0.3)	2.7 [2. 3]
SEC-mount (score)	2.4 (0.4)	2.7 [2; 3]
SEC-walk (score)	2.4 (0.4)	2.7 [2; 3]
SEC-trot (score)	2.0 (0.4)	2.3 [1.3; 3]
SEC-canter (score)	1.9 (0.5)	2.5 [1; 3]
Rider survey		
SEAT (score)	2.0 (0.6)	2 [1; 3]
HAND (score)	2.0 (0.5)	2 [1; 3]
FOCRIDER (score)	2.1 (0.4)	2 [1.3; 2.7]
FOCSURR (score)	1.8 (0.4)	1.7 [1; 2.7]
Rider survey		
SATISF (score)	1.9 (0.4)	2 [1; 2.3]
FEELINGS (score)	1.9 (0.4)	2 [1; 2.7]

ranges and standard deviations. Thus, it could be assumed that the studied population differed sufficiently in terms of their individual reaction during tests when handled and under the rider. Similarly, the responses to the rider survey showed a variability confirming individual differences in the response to the test elements.

Carton and blanket (CB) test

The times to pass the path in the C and B tests with the horse led in hand were correlated (r_s=0.66, P<0.05), which means that both elements of the CB test measured in part the same aspect of horse reactivity. The time to cross the path in the hand-led C test was not predictive of the time to pass the riding C test, but the more time the horse needed to cross the path with the carton, the longer it took for the rider to cross the path with the blanket in trot (r_s=0.46, P<0.05).

The B test was much more informative as to the time to cross the runway when the horse was ridden. The time to cross the path with the blanket in hand was correlated with that to cross it when the horse was ridden in walk (r_s=0.47, P=0.05), in trot (r_s=0.68, P<0.01), but also with the time to cross the path with the carton when under the rider in walk (r_s=0.48, P=0.05) and in trot (r_s=0.49, P<0.05).

Obedience of the horse and perceived safety of the rider

The perceived safety of the horse was highly correlated to its obedience during brushing (r_s=0.91, P<0.01), saddling (r_s=0.81, P<0.01), leading (r_s=0.84, P<0.01), mounting (r_s=0.63, P<0.01), walking (r_s=0.58, P<0.01), trotting (r_s=0.65. P<0.01) and cantering (r_s=0.55, P<0.05) [Górecka-Bruzda et al. 2015].

Satisfaction from the ride and general feelings for the horse

Several variables measured in the CB test, in the test ride and in the rider survey were related to the satisfaction from the ride and the general positive feelings for horses (Tab. 4). The more time the horse needed to cross the path, the less satisfaction was declared by the riders (CT-IH: r_s=-0.62, P<0.05 and BT-IH: r_s=-0.62, P<0.01; Tab. 4). The same was true for feelings: the faster the horse was to cross the path, the more positive feelings were experienced by the riders (CT-IH: r_s=-0.57, P<0.05 and BT-IH: r_s=-0.62, P<0.01, Tab. 4). The times taken for crossing the path when ridden in walk and trot were correlated neither to the satisfaction nor to the feelings for the horse.

As expected, rideability characteristics, i.e. responsiveness to hands and the seat as well as the focus on the rider were highly predictive of the rider's satisfaction (r_s=0.70, P<0.01; r_s=0.50, P<0.05 and r_s=0.76, P<0.01 for SEAT, HAND and FOCRIDER, respectively; Tab. 4). Moreover, obedience during the ride in trot (r_s=0.53, P<0.05) and canter (r_s=0.81, P<0.01) contributed highly to the satisfaction of the rider (Tab. 4). Similarly, the perception of safety in walk (r_s=0.49, P<0.05), trot (r_s=0.75, P<0.01) and canter (r_s=0.74, P<0.01) was an important factor contributing to the rider's satisfaction (Tab. 4).

Table 4. Spearman rank correlation coefficients for riders' satisfaction from the ride and general feelings for the mount: A/ results of CB test, B/ rideability characteristics of horses and C/ obedience and perceived safety

Item	Satisfaction	General feelings
Variable		
A/ CB test		
Carton tests (CT)		
CT-IH	-0.62**	-0.57*
Blanket test (BT)		
BT-IH	-0.62**	-0.62**
B/ Rideability characteristic		
SEAT	0.70**	0.67*
HAND	0.50*	
FOCRIDER	0.76**	0.52*
C/ Obedience and safety		
OBED-trot	0.52*	0.57*
OBED-canter	0.81**	
SEC-walk	0.49*	
SEC-trot	0.75**	0.57*
SEC-canter	0.74**	0.57*

*P<0.05; **P<0.01
Only significant correlations are shown.

As the satisfaction was correlated to general feelings for the horse, the positive emotions were growing as satisfaction increased (r_s=0.69, P<0.01). Thus, most characteristics related to the riders' satisfaction correlated with positive emotions for horses (SEAT: r_s=0.67, P<0.05; FOCRIDER: r_s=0.52, P<0.05; OBED-trot: r_s=0.57, P<0.05; SEC-trot: r_s=0.57, P<0.05 and SEC-canter: r_s=0.57, P<0.05; Tab. 4).

Rideability characteristics

The characteristics of rideability were positively related to each other (Tab. 5). Actually, the better the horse responded to the rider's aids, (HAND: r_s=0.70, P<0.01; SEAT: r_s=0.87, P<0.01, Tab. 5), the more focused on the rider it was. Responsiveness to the rider's hands and seat were also correlated (r_s=0.70, P<0.01; Tab. 5). Interestingly, attention paid to the surroundings was positively related to all characteristics of rideability except for FOCRIDER (Tab. 5). None of the rideability characteristics could be predicted from the CB tests, but several obedience and safety variables were negatively correlated to the times to pass the path when the horse was hand-led (BT and CT) and when ridden in walk (CT) and trot (BT) (Tab. 6).

Generally, it has been confirmed that satisfaction from the ride results in highly positive feelings for the horse. This is a primary requirement for a horseman to be

Table 5. Spearman rank correlation coefficients between rideability characteristics of horses

Item	SEAT	HAND
HAND	0.70**	-
FOCRIDER	0.87**	0.70**
FOCSURR	0.52*	0.48*

*P<0.05; **P<0.01
Only significant correlations are shown.

Table 6. Spearman correlation coefficients between variables of CB tests and rider survey

CB test	CT-IH	CT-WALK	BT-IH	BT-TROT
Rider survey				
OBED-lead			-0.48*	
OBED-mount			-0.47*	
OBED-walk		-0.60**		
OBED-trot	-0.66**			
OBED-canter	-0.57*			
SEC-walk			-0.60**	
SEC-trot	-0.48*		-0.58**	
SEC-canter				-0.63**

*P<0.05; **P<0.01
Only significant correlations are shown.

interested in providing a high welfare standard to the animal. Our test, developed for a quick and simple appraisal of horse behaviour, proved to be useful and feasible in field conditions, as the outcome of the tests was related to the declared level of satisfaction and feelings for the horse. Although not all variables measured by the test were directly predictive of the riders' satisfaction or feelings for horses, the set-up of the experiment facilitated testing of rideability characteristics under standardised conditions. A lack of any relationship between satisfaction and the results of horses when ridden was probably due to the habituation to the objects in the path, crossed previously in hand [Górecka *et al.* 2007]. However, considering safety of the horse-human pair and the hand-led test results being predictive of the studied variables, the CB test may be recommended for practical applications.

During the test ride, sensitivity to riders' aids (hands and legs) was highly predictive of human satisfaction, which is in line with the findings of Visser *et al.* [2008]. This is evident since a well-reacting horse enables the rider to precisely complete the task. Sensitiveness to hands and legs was related to the ability of the horse to be attentive to the rider's commands. It should also be stressed that general sensitiveness, i.e. attentiveness to the environment, was also important for rideability of the horse, which shows that unresponsiveness to external cues was not valued by riders. Sensitiveness

to the touch is assumed to be a temperamental trait [Lansade *et al.* 2008, Suwała and Górecka-Bruzda 2013]. However, for responsiveness to particular riders' cues to be precise, appropriate training should involve the process of learning what signals to respond to and with what intensity. This means that the character of the horse [Suwała and Górecka-Bruzda, 2013], is also involved in rideability of horses. Thus, for equitation to become a satisfying activity for the rider, the choice of the mount with appropriate mental characteristics is very important.

Additionally, obedience of the horse and the rider's perceived safety were the factors increasing the satisfaction and positive feelings of the rider. The possibility to predict the level of perceived safety in riders using behavioural tests in the horse's home box was proven in our previous study [Górecka-Bruzda *et al.* 2015]. We can confirm here that results of the in-hand and ridden CB tests were also predictive of obedience and safety variables.

The results of the present study show that satisfaction from the ride is provided by horses that are easily led through a path containing threatening objects, are sensitive to riders' aids, focused on the rider, but also on their surroundings, are obedient and safe. All those characteristics could be assessed with the Carton and Blanket Tests. Thus, to test differences in behavioural characteristics which contribute to a satisfactory and safe use of horses, we can propose these tests for a preliminary appraisal of horses intended for leisure activities.

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