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Development of personality tests to use in the field, stable over time and across situations, and linked to horses' show jumping performance

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ABSTRACT

This study aimed to identify tests that include all the criteria necessary to characterise reliably the personality of horses on a large scale: stability of measures across situations and over time, evaluation of independent dimensions, links with use and easy to organise for a large number of animals. For this purpose, two independent experiments were carried out, involving respectively 24 (experiment 1) and 15 horses (experiment 2). Existing tests were adapted to facilitate their use during breeding horse shows, while their owners held their horses in hand. They were called the "*Simplified Personality Tests" (SPT)*. They involved three fear tests (novel surface, novel object and suddenness), two tactile sensitivity tests (Von Frey filament and hip-stifle axis stimulation) and behavioural measurements conducted during standard horse show tests (assessment of horse conformation and jumping ability). Following the first experiment, it was demonstrated that the measurements carried out during two of the fear tests were significantly correlated (correlations between "novel surface" and "suddenness": $R = 0.42$, $p = 0.04$, $N = 24$), as was also the case for the two tactile sensitivity measures (correlation between "filaments" and "hip-stifle axis" $R = 0.50$, $p = 0.01$, $N = 24$). However, the fear and tactile sensitivity measures were not correlated, indicating that they reflected independent dimensions. To test for stability across time, we checked whether the measurements performed during these *SPT* correlated with equivalent measurements recorded from another series of tests (*"Complete Personality Tests")* obtained one month earlier and whose stability over several years had previously been demonstrated. These correlations were all significant except for the "novel object test". Thus, except for the latter test, all measures were stable across situations and over time and evaluated two independent dimensions: fearfulness (disposition to react to a greater or lesser extent to new or sudden stimuli) and tactile sensitivity (disposition to react to a greater or lesser extent to tactile stimulation). To determine the relationship between these measures and the horse's behaviour while competing in show jumping competitions, we observed horses ridden during training sessions or competitions one month (experiment 1) or one year (experiment 2) after the tests. Principal component analyses showed that such relationships existed: the most fearful and to a lesser extent the least sensitive horses were more difficult to ride, but performed better when competing because they knocked down fewer bars. Finally, these tests were conducted on more than 650 horses over three years, demonstrating that they are easy to organise on a large scale.

1. Introduction

Personality, the term used here as a synonym for temperament, can be defined as a set of behavioural tendencies called traits or dimensions which are present early in life and are relatively stable across various situations and over the course of time (Goldsmith et al., 1987; Bates, 1989). These dimensions are mutually independent. Currently, there are an increasing number of studies on

Abbreviations: CPT, Complete Personality Tests; SPT, Simplified Personality Tests; Exp. 1, experiment 1; Exp. 2, experiment 2.

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personality because it represents a major factor influencing the life of an animal from different points of view. For example, personality traits such as fear or docility have an impact on welfare and adaptation to rearing conditions of captive wild and domestic animals (Coleman, 2012; Tetley and O'Hara, 2012; Gartner and Weiss, 2013; Ijichi et al., 2013; Konig v Borstel, 2013). Dimensions such as fearfulness or boldness are also reported to have a strong influence on learning performance in many species (Sih and Del Giudice, 2012), including horses (Lansade and Simon, 2010; Christensen et al., 2012; Lansade et al., 2013; Valenchon et al., 2013a,b,c). Personality is also an important factor to consider when animals are trained by humans. For example, in working dogs, the boldness dimension is correlated with performance during working dog trials (Svartberg, 2002).

In particular, personality is a key element to be taken into account in the breeding and riding of horses. It is cited as the first selection criteria for riding schools, before morphology or price (Buckley et al., 2004). A large-scale survey of competitive or leisure riders, horse professionals and breeders conducted in 13 countries reported that it was the most important criterion to be considered (Graf et al., 2013). Furthermore, attempts to evaluate personality are already included in different selection programmes for sports horses (Koenen et al., 2004), but these evaluations are often subjective and non-standardized (Konig v Borstel, 2013). Nevertheless, a large number of personality tests have been developed over recent years to evaluate traits such as fearfulness, confidence, boldness, extraversion, reactivity towards humans, locomotor activity, social motivation, gregariousness or tactile sensitivity (review: Konig v Borstel, 2013).

Out of all the tests developed only a few have proved to measure effectively responses which are stable over time and across situations, the two key criteria used to define personality. This is the case for Visser's tests (2001) which demonstrate stability for several weeks or months, and also for the series of tests we have developed which show stability over several years (Lansade and Bouissou, 2008; Lansade et al., 2008a,b,d). Nevertheless, most of the tests showing stability are long and difficult to set up in the field. For example, the tests we have developed are too expensive and complicated to be used for hundreds of individuals every year. On the other hand, other tests such as those of Burger et al. (2007), Górecka-Bruzda et al. (2011) or Graf et al. (2014) can be easily implemented to test many horses in the field, but do not necessarily meet all the criteria required in terms of personality traits, in particular, stability across situations and over time and independence of the traits measured. Finally, for these tests to be useful in selection programmes, a clear relationship with the horse's purpose needs to be demonstrated. This is the case for the reactivity measures in the field developed by Rothmann et al. (2014), which are negatively correlated with rideability and free jumping performances, but which do not show stability or evaluate a distinct and identifiable personality dimension.

In fact, to our knowledge no studies have proved that any set of tests unites all the criteria required for selection of horses on a large scale: 1/easily applied to a large number of animals, 2/stability across measurement situations, 3/stability of the measurements over time, 4/evaluating independent dimensions, and 5/related to the animal's purpose. The aim of our study was thus to identify new or existing tests which bring together all these criteria. In particular, we focused on: fearfulness (disposition of an individual to react to a greater or lesser extent to novel or sudden stimuli) and tactile sensitivity (disposition of an individual to react to a greater or lesser extent to sensory stimulations in its environment—particularly to tactile stimulations in the present case), because they have been reported to be linked to designated purposes and learning performances in several species including horses (Svartberg, 2002; Lansade and Simon, 2010; Christensen et al., 2012; Lansade et al., 2013; Valenchon et al., 2013b).

2. Material and methods

All experimental procedures were in accordance with the ethical guidelines of the International Society for Applied Ethical Ethology. The horses tested in this experiment were not research animals. Their owners' were responsible for their husbandry and care. The owners gave prior permission for their horses to be tested or observed during the training sessions, breeding shows and competitions.

2.1. Experimental design

In this study, existing tests to evaluate fearfulness and tactile sensitivity were adapted in order to facilitate their use during large shows of young horses in France: breeding shows assessing conformation and gaits. To achieve this, the tests were modified to require no specific facilities or locality and to be conducted while horses were held in hand by their owners for reasons of liability. Certain behaviours were also observed during existing show assessments (assessment of horse conformation and jumping ability). These tests were called *"Simplified Personality Tests" (SPT)*. Two independent experiments, involving two different populations of horses, were conducted to meet the study objectives (Fig. 1). In the first experiment, we tested the stability across situations and over time, and the independence of the dimensions measured. The fearfulness and tactile sensitivity dimensions were each measured using at least two tests. To evaluate the stability across situations, Spearman correlations were calculated between the variables recorded during the fearfulness tests, then between the variables recorded during the sensory sensitivity tests. To test the independence between the dimensions, Spearman correlations were calculated between the variables recorded during the fearfulness tests and those recorded during the sensory sensitivity tests. To test for stability across time we checked whether the results obtained from the *SPT* correlated with those obtained from *"Complete Personality Tests"* (*CPT*) conducted one month earlier and whose stability over several years had previously been demonstrated (Lansade and Bouissou, 2008; Lansade et al., 2008a,b,d). Finally, to determine the relationship between the measures recorded during the *SPT* and the horses' behaviour when show jumping, we observed the horses when ridden during training sessions or show jumping events, either 1 month after the *SPT* (Exp. 1) or 1 year later (Exp. 2). In the case of the first experiment, the *SPT* were conducted under standardized conditions while in the second experiment, they were conducted under real field conditions within the framework of a testing campaign involving several hundred horses.

2.2. Experiment 1: Simplified personality tests conducted under experimental conditions

2.2.1. Animals

The study group consisted of 24 horses of which 16 were 4-year olds and eight were 5-year olds. There were 21 French Saddle horses, two Dutch Warmbloods and one Anglo-Arabian. All the horses were housed in individual loose boxes and turned out into grass or sand paddocks two or three times a week. They were fed concentrate pellets and barley three times per day and hay twice a day. All the horses had been started under the saddle at three years of age. They were ridden daily and regularly took part in show jumping competitions from March 2013.