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Stranger danger? An investigation into the influence of human-horse bond on stress and behaviour

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ABSTRACT

Human-animal bond is receiving increasing attention and is thought to confer benefits on well-being and performance in working animals. One important benefit of bonding is the "safe base" an attachment figure provides, which manifests in better coping and increased exploration during potential threat. However, there is limited research exploring the existence or benefits of human-horse bonds, though bonding is sought after by both pleasure and elite riders. The purpose of the current study was to determine whether the presence of horses' owners confers a safe-base, therefore improving horse behaviour and physiological stress responses during novel handling tests. Horses completed two different handling tests, one with their owner and the other with an unfamiliar experimental handler (n = 46). Test and handler order was randomised and handlers were double blind to the performance of the horse with the alternate handler. Time taken to complete the tests and proactive behaviour were measured as indicators of performance and compliance. Core temperature, discrepancy in eye temperature, heart rate and heart rate variability were recorded to assess stress responses. If horses experience a "safe base" effect in the vicinity of their owner, they would be expected to show lower stress responses and greater behavioural compliance, compared to being handled by a stranger. There was no difference in behaviour or any physiological stress response between the handlers. This indicates that a calm, competent, but unknown handler may be equally effective to an owner during stressful procedures as neither equine performance nor affective state supported a safe-base effect. This supports previous research suggesting that the level of bond between human and horse may not be the most salient factor in coping or compliance during training and handling. These findings have implications for veterinary and clinical behaviour counselling, where novel human handlers must modify behaviour under potentially stressful circumstances.

1. Introduction

Human-animal bond has received increasing interest in recent years (e.g. Payne et al., 2016, 2015). Attachment Theory is concerned with the development of bonds between infants and their caregivers both within humans (Cassidy, 1999) and other mammalian species (Newberry and Swanson, 2008). It is theorised that appropriate bonds aid in survival because vulnerable offspring keep close to their mothers in such species. Since domestic animals depend on human caregivers to a certain extent, some level of attachment-type bond may exist. A fully developed relationship bond is characterised by proximity seeking, secure base, safe haven and separation distress (Cassidy, 1999). Secure base refers to reduced stress under perceived threat and increased exploration in the presence of the attachment figure (Mikulincer and Shaver, 2003). It is therefore, a suitable construct of bonding to investigate objectively in human-animal bonds.

Bonding between animals and their human caregivers is highly desirable as it is purported to improve human well-being (Walsh, 2009) and is anecdotally reported to affect training outcomes in horses (e.g. Parelli, 1993; Roberts, 1997). Within competitive equestrianism, human-horse bonds are thought to be integral to the success of partnerships during challenging and highly pressurised situations (Fallis, 2013). However, due to this perceived importance, and the fact that many human carers feel strong bonds towards their animal companions, it may be that reciprocal bonds are incorrectly perceived. Species that are highly dependent upon their care-giver, such as dogs, may be presumed to have more opportunities to bond. Indeed, the safe base effect has been observed in dogs (Gácsi et al., 2013), whilst separation anxiety is a relatively commonly recognised phenomenon in this species when isolated from their owners (Riemer et al., 2016) Horses do not live as inter-dependently with their carers, yet studies indicate that horses can discern the difference between familiar and unfamiliar

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humans and that this elicits different cognitive responses (Proops and McComb, 2012). Therefore, it is possible that such bonds do form in a species that does not live in such close proximity with their carers, though this has not yet been investigated to our knowledge.

Whilst familiarity is known to have positive influences on behaviour during handling in horses (Marsbøll and Christensen, 2015), the effect of more complex bonds that may result from longer term interactions has not been assessed. Therefore, the current study aims to determine whether horses respond differently to novel handling challenges, depending on whether they are with their owner or a stranger. To this end, horses completed two novel handling tests, one with their owner and the other with an unknown experimental handler. Time taken to complete the task and proactivity during refusal were measured as indicators of compliance and performance. Heart rate, heart rate variability, core temperature and the discrepancy between eye temperatures were measured as physiological indicators of stress and affective states. If an owner provides a safe base as the result of a human-horse bond (Cassidy, 1999), horses would be expected to take less time to complete the tasks, show less potentially dangerous proactive behaviour and have lower physiological indicators of stress, compared to when handled by an unfamiliar person.

2. Method

The current experiment was conducted within an indoor arena at Hartpury College Equestrian Centre, Gloucestershire (UK) in October 2016. Subjects were liveries at this facility which allowed testing to occur in a home arena, reducing the effects of environmental novelty (Wolff et al., 1997). Forty-six horses of mixed breeds and genders (26 geldings and 20 mares) took part. Age ranged from 3–20 years (mean = 9.33 ± 4.20). All subjects had completed at least preliminary work under saddle. Subjects were housed and managed as per owner preferences on a large livery yard. In general, subjects were provided forage three times a day with hard-feed dependent on workload and nutritional requirements and constant access to fresh water. They were individually stabled with a minimum of 1 h of exercise each day but with limited or no turn-out at the time of testing. The typical method of training was not known and will depend on owner preference, temperament and knowledge. Therefore, subjects are likely to have been trained differently regarding positive and negative reinforcement. Subjects were handled in their own headcollar, providing it did not include inbuilt pressure mechanisms.

2.1. Handlers

The familiar handler was the owner and daily care-giver of the subject. The unfamiliar handler was the same for all subjects (C.I.) and had not made contact with any subject prior to testing. This individual was a competent, experienced handler and had completed similar handling tests before (Ijichi et al., 2013). The experimental handler wore the same clothing for all tests, whilst owners were free to choose their own attire. This was to reduce the potential effect of clothing on how subjects perceived the unfamiliar handler (Hausberger et al., 2008). Both the owner and experimental handler wore gloves, a riding helmet and protective footwear.

2.2. Handling tests

Tests required subjects to navigate novel objects in response to leadrope pressure, which is an aid used to indicate that the horse should step forward (McGreevy and McLean, 2007). Each test was sufficiently different to prevent habituation, which might alter behaviour between the first and the second test. Task A consisted of a 2.5 m × 3 m blue tarpaulin secured to the surface of the indoor holding arena by 20 individual tent pegs (Ijichi et al., 2013). To complete this test, the subject walked over the tarpaulin. Test B consisted of a frame that was 2.5 m high and 1.6 m wide, from which hung 2 m long coloured plastic streamers (Squibb et al., 2018). To complete this test, the subject walked through the frame, causing the streamers to touch the face and body of the subject as they passed through.

Both objects were present within the test arena and faced the exit and conspecifics, because differing directions could have affected the motivation to complete the test. A standard jump pole was placed 2 m in front of each test, which the subject walked over to mark the start of the test. Handlers indicated that the horse should walk towards the obstacle using leadrope pressure but no verbal or additional tactile cues were permitted. Horses had a maximum of 3 min to complete each handling test, as previous research indicates that horses that have not completed the test within this time do not do so (Ijichi et al., 2013). Tests were recorded on video for post-hoc analysis.

2.3. Experimental design

Upon arrival at the testing area, horses were fitted with a Polar Equine V800 heart rate monitor by K.G. (Polar Electro Oy, Kempele, Finland). The elasticated surcingle was attached to the girth area, which had been moistened with water to aid conductivity. After confirming that HR was being detected, subjects were given a minimum of 5 min to habituate to the monitor. This was deemed sufficient as all subjects had previously worn girths and/or lunging rollers. During habituation, subjects were outside of the indoor testing arena and could not see the novel objects.

Test order and handler order was randomised and horse order was pseudo-randomised, depending on the availability of subjects. Each handler was blind to the subject's behaviour with the alternate handler. Additionally, owners were expressly forbidden from discussing the likely behaviour of the subject. Double-blinding was possible as the test arena had solid doors and a research assistant remained outside at all times to prevent the second handler from attempting to see into the arena. Subjects entered the arena with the first handler and proceeded to a designated area for eye temperature measurement. This was marked by two parallel jump poles in the same position and direction within the enclosed area. This was to reduce the potentially confounding effects of direct sunlight and environmental factors on IRT readings (Church et al., 2014). The research assistant (K.S.) stood at a marked point approximately 1 m and 90 degrees from each eye (Travain et al., 2015; Yarnell et al., 2013). Images were taken using a FLIR E4 thermal imaging camera (FLIR Systems, USA.). The handler then led the subject towards Test A or B as randomly allocated.

Upon successful completion of the task, or termination at 3 min, the subject was led back to the designated area for post-test eye temperature readings. Recordings were taken as per pre-test procedures. Horses that completed the task in less than 3 min were then held within the arena for the remainder of the available crossing time. This ensured the second handler could not deduce the subject's behaviour during the preceding task, as all horses remained in the arena for a similar amount of time. Upon leaving the test arena, the subject had a minimum of 5 min to recover, before re-entering with the second handler. The procedure was then repeated verbatim.

2.4. Analysis

2.4.1. Behaviour

Crossing time began when the first fore-limb bore weight after the ground pole 2 m in front of the obstacle. Crossing time ended when the last hind-limb bore weight on the tarpaulin for Test A (Ijichi et al., 2013), or when the tail of the subject had passed through the frame for Test B (Squibb et al., 2018). Horses that did not complete the test were recorded a Crossing Time of 180 s. Proactivity (outlined below) was calculated as per Ijichi et al. (2013). Refusal behaviour was defined as any behaviour which did not contribute to crossing the object. This included moving backwards, sideways, forwards but away from the