Science of horse training: Implications for rider safety and animal welfare.

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Introduction

This multidisciplinary collaborative project addresses the urgent need for a scientific approach to training the ridden horse to enhance the welfare of horse and rider safety. There are thought to be up to 1.5 million horses in Australia and the horse industry is estimated to contribute over $6.2 billion a year to the Australian economy (AIHC 2000). Horse riding at its most humane relies on subtle interactions between horse and humans (McGreevy, 2002). Humans have a profound influence on the behaviour and welfare of horses, in-hand and under-saddle through riding with stimuli from their hands on the reins and their legs on the sides of the horse and, more discreetly, with the use of their seat, weight position and movement (McGreevy 2004). Contradictory training and inexpert riding makes for a confused and dangerous horse. Previous studies indicate that behavioural problems account for up to 66% of euthanasia in young horses (Odberg and Bouissou, 1999).

Horses, like all animals, learn most effectively when training methods are appropriate to their cognitive ability and ethology and based on a valid interpretation of learning theory (McGreevy and McLean, 2007). Operant conditioning is a fundamental of learning theory that involves presenting or omitting some reward or punishment when an animal makes an appropriate response. Effective riding involves the correct application of negative reinforcement (removal of pressure when the animal behaviours appropriately) and the subsequent transfer of stimulus control to various classically conditioned cues (such as those coming from the seat). Inappropriate training practices can have a negative impact on the horse's welfare and lead to conflict behaviours that jeopardise the safety of riders and handlers.

Equitation has, to date, relied upon subjective assessments of the dynamics between horse and their riders. This is growing evidence that there is a gap in the knowledge of professional equestrian coaches and that equitation is lagging behind other human-animal interfaces. A recent study indicates that Australian equestrian coaches are inconsistent into the way in which they define and report the use of training interventions (Warren-Smith and McGreevy, 2008).

Equitation science is the measurement and interpretations of interactions between horse and their riders. This project will use equitation science to reappraise the ways in which riding horses are trained.

This project aims to:

Identify measure and codify the nature of the learning process in the horse and in particular the shift from operant conditioning to classical conditioning through a longitudinal study of horses in foundation training.

Identify measure and codify the normal range of stimuli used in equitation by measuring a range of rider and horse combinations.

Identify measure and codify the practices of elite equestrian athletes by measuring these athletes interactions with their mounts.

Develop a set of recommendations for the application of learning theory in equitation that can be disseminated by national and international peak bodies to their members, coaches and judges, and the

broadest possible audience via the unique education platforms available through the Partner Organisations.

Develop and validate an innovative package of training tools for coaches that combine advances in sport measurement technology with learning theory for the careful objective evaluation of training methods that will ultimately improve welfare of horses and enjoyment of riders.

Explore the physiological consequence of current industry standard pressures as applied horses' mouths.

Achievements of the past twelve months.

Paper: "Variability of scores in the 2008 Olympic dressage competition and implications for horse training and welfare." Accepted for publication in the Journal of Veterinary Behaviour.

Paper :"The roles of equine ethology and applied learning theory in horse-related human injuries." Submitted to the Journal of Veterinary Behaviour.

Data collection for research into: "Is safety valued in children's ponies in Australia?" ongoing.

Methodology for principle research into learning theory in horses agreed (see below).

Both human and animal ethics proposals approved by relevant University of Sydney Ethics Committees.

Saddle pressure detection pad system sourced, purchased and operational.

Rider leg pressure detection system sourced and purchased – some design issues currently being worked through.

Rein tensiometer and accelerometers sourced.

Saddlery requirements agreed with Bates Saddlery who are supply fully mounted saddles for the project.

Experimental Design.

The main thrust of the research involves four experiments. These are set out below in Table 1 and 2. It is hoped that recruitment of participants (both horses and riders) will commence in March 2010. Recruitment of riders and horse will be coordinated through the Australian Equine Behaviour Centre. Anyone interested in participating in this study is asked to apply via www.aebc.com.au.

Acknowledgements

The project has triggered a unique collaboration by nine stakeholders: **Federation Equestre Internationale** (FEI, horse sports governing body globally), the **EFA**, the Biomechanics Unit at the **Australian Institute of Sport** (AIS), the **Australian Equine Behaviour Centre** (AEBC), the **Horse Council of South Australia**, **Bates Australia**, (one of the world's leading saddlers), ***Hoofbeats*** and ***The Horse Magazine*** (THM) (Australia's foremost equestrian magazines) and our major funding body, **Rural Industries Research and Development Corporation.**

All the researchers involved in this important project gratefully acknowledge the support from all the stake holders.

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Odberg, F.O., Bouissou, M.F., 1999. The development of equestrianism from the baroque period to the present day and its consequences for the welfare of horses. Equine Vet J Suppl, 26-30.
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EXPERIMENT 1 Determining the norm.	EXPERIMENT 2 Rider variability	EXPERIMENT 3 The learning process	EXPERIMENT 4 Describing the elite: measuring for performance
Hypothesis 1. The lesser trained horses will require a stronger stimulus from the rider to elicit the required operant response. Hypothesis 2 The leg and rein stimuli will be greater in the lesser trained horses than the more advanced horses. Hypothesis 3 The leg and rein stimuli will show smaller pressure in the more trained horses to obtain the desired response. Hypothesis 4 The horses at higher training levels will respond to classically conditioned responses such as seat pressure and require less leg and rein pressure.	Hypothesis 1. If the rider is more skilled then the signals delivered to the trained horse there will be less leg and/or rein pressure to elicit the correct response from the horse. Hypothesis 2. If the rider is less skilled the signals to the horse will show more variation in pressure and loci of application. The horse's response to these inconsistent stimuli will be less accurate.	Hypothesis 1. As the horses become more trained the leg and/or rein pressure from the riders required to stimulate the correct response from the horse will be reduced. Hypothesis 2. If the horse moves from operant conditioning to classical conditioning (as proposed by horse trainers) the seat stimuli will elicit accurate responses.	Hypothesis 1. If current horse training dogma is correct then the riders and horse combinations working at the elite level will demonstrate a then the signal and response system based on classical conditioning i.e. seat stimuli more dominant than leg and rein stimuli.
Ten advanced horses	Ten advanced horses		Ten Advanced horses
Ten intermediate horses			
Data from Experiment 3, week 6, ten naïve horses at end of Foundation training		Ten naive horses tested once per week over six week initial training period	
Two/three advanced riders	Ten riders from each level: naïve, intermediate, advanced	Two/three advanced riders	Ten advanced rider/horse combinations

TABLE 1.: EXPERIMENTAL DESIGN OF EQUITATION SCIENCE PROJECT

DEFINITIONS	RIDER	HORSE
Naive	Can walk, trot, canter, stop and back independently in enclosed area.	Just handled through to completion of foundation training i.e. walk, trot, canter, stop and back independently in enclosed area.
Intermediate	Competing or working at the equivalent of EFA Novice level	Competing or working at the equivalent of Equestrian Federation of Australia Novice level
Advanced	Competing or working at or above equivalent of FEI Prix St Georges	Competing or working at or above equivalent of FEI Prix St Georges level.

TABLE 2. DEFINITIONS OF RIDER AND HORSE SKILL LEVELS.