A preliminary investigation of the asynchrony of horse, saddle and rider interaction

Bondi, A.; Gandy, E.; Hogg, R., University of Sunderland

Movements of horse and rider influence each other but this complex coupling via the saddle and the implications for welfare and performance are not fully understood. Asynchrony is the temporal phase shift between these three elements. The aim of this study was to investigate the asynchronous interaction between horse, saddle and rider.

14 horse/rider combinations (novice-advanced) performed walk, trot and canter from both directions onto a marked runway. High definition video was captured for Dartfish^{TM} and EMAS^{TM} (Equine Motion Analysis System) analysis in the caudal plane. Markers were applied to: rider lumbosacral joint; horse tubera coxae and caudal vertebrae; midline of the saddle. The endpoint of the first phase of each stride cycle was taken over three complete stride cycles. Relative positions of the three markers were analysed to calculate the degree of vertical misalignment (normalised to percentage of horse pelvic width) of the saddle and rider from the horse.

Preliminary observations revealed that the majority of horses demonstrated asymmetric pelvic movement and carried the saddle to one side, affecting rider asymmetry. The degree of asynchrony was influenced by: horse gait/degree of soundness; horse back shape; saddle design; rider pelvic dysfunction The range of saddle displacement across the stride cycle was greater than that of the rider, but the rider remained more closely aligned with the saddle than with the horse. A subset (n=5) of differing riders on the same horse showed an average offset, of 4.82 ± 0.67 (mean ± sd). A single sample t-test found this offset to be statistically significant at the 1% level ($p<0.01$, two-tailed test).

Measurement of asynchrony in the interaction between horse, saddle and rider could be used in the early assessment of poor performance and therefore improve the management and welfare of the ridden horse.