

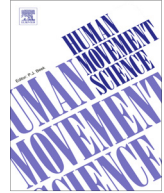


ELSEVIER

Contents lists available at ScienceDirect

Human Movement Science

journal homepage: www.elsevier.com/locate/humov



Differences in rider movement pattern between different degrees of collection at the trot in high-level dressage horses ridden on a treadmill



A. Byström^{a,*}, L. Roepstroff^a, K. Geser-von Peinen^b, M.A. Weishaupt^b,
M. Rhodin^c

^a Department of Anatomy, Physiology and Biochemistry, Swedish University of Agricultural Sciences, S-750 07 Uppsala, Sweden

^b Equine Department, Vetsuisse Faculty, University of Zurich, CH-8057 Zurich, Switzerland

^c Department of Clinical Sciences, Swedish University of Agricultural Sciences, S-750 07 Uppsala, Sweden

ARTICLE INFO

PsychINFO classification:
3720

Keywords:
Collection
Equestrian dressage
Kinematics analysis

ABSTRACT

Collection is a central term in equine dressage, defined as a shortening of the horse's stride length with retained energy and hind limb activity. How collection is induced by the rider has yet not been investigated objectively. The aim of this study was therefore to compare the movement pattern of high-level dressage riders between free trot (loose reins), passage and a range of three speeds in collected trot.

Both at higher speed in collected trot and in passage, the rider's pelvis became more caudally rotated and the rider's lumbar back became more flexed. However, in passage there was also a decrease in phase-shift between horse and rider movements, suggesting that the rider used the seat more actively. In free trot, the rider's pelvis was more cranially rotated, the lumbar back was more extended, the rider's body inclined more forwards, and the phase-shift between horse and rider was increased, compared to collected trot. The observed changes were partly explainable from changes in the horse's movement pattern. However, most differences in rider body position seemed unrelated to the horse's movements, but were in accordance with instructions in equestrian texts, suggesting that those changes were voluntarily adopted by the riders.

© 2015 Elsevier B.V. All rights reserved.

* Corresponding author. Tel.: +46 736 283908.

E-mail address: anna.bystrom@slu.se (A. Byström).

1. Introduction

Collection is a central term in equine dressage, defined as a shortening of the horse's stride length with retained energy and hind limb activity (Fédération Equestre Internationale [FEI], 2011). The ability of the horse to perform collected gaits, in particular the piaffe and the passage, is crucial for high-level dressage performance (Holmström, Fredricson, & Dreveno, 1995). The collected gaits are created and shaped through the interplay between horse and rider. However, what that means in terms of rider kinematics has, to the authors' knowledge, not yet been investigated.

The rider's position and movements in different gaits have been documented in several previous studies, by use of either camera recordings with optical markers (Byström, Rhodin, von Peinen, Weishaupt, & Roepstorff, 2009, 2010; Lovett, Hodson-Tole, & Nankervis, 2004; Schils, Greer, Stoner, & Kobluk, 1993; Symes & Ellis, 2009) or inertial sensor units fixed to the rider's body (Münz, Eckardt, Heipertz-Hengst, Peham, & Witte, 2013; Münz, Eckardt, & Witte, 2014). Additionally, camera recordings and accelerometers have been used to study the coordination pattern between horse and rider during basic dressage (Lagarde, Kelso, Peham, & Licka, 2005; Peham, Licka, Kapaun, & Scheidl, 2001; Witte, Schobesberger, & Peham, 2009; Wolframm, Bosga, & Meulenbroek, 2013) and in endurance riding (Viry et al., 2013). One of the latter studies also investigated if differences in horse–rider coordination pattern between different riders were accompanied by changes in the horse's movements (Lagarde et al., 2005). However, none of the studies has evaluated how changes in the rider's movements influence the horse, and *vice versa*, within the same gait and horse–rider combination.

Studies have shown that the horse's movement pattern differs between free trot (unrestrained horse, loose reins) and collected trot (Rhodin, Gomez Alvarez, Byström, van Weeren, et al., 2009; Weishaupt et al., 2006), and between collected trot and passage (Weishaupt et al., 2009). These differences could potentially influence the rider's movement pattern. However, since the equestrian literature states that riders should adjust their seat depending on the degree of collection that is being requested from the horse (von Dietze, 2005), changes may also be voluntarily adopted by the riders. It is therefore relevant to review any changes in the rider's movement pattern both in relation to the movements of the horse, and to statements in equestrian texts, when trying to understand the interplay between the horse and rider in different degrees of collection.

The aim of this study was to compare the movement pattern of high-level dressage riders between free trot, collected trot, and passage. For collected trot a range of three speeds was included, to enable differentiation between effects of speed and effects of the different forms of trot, i.e., free trot or passage compared to collected trot.

2. Material and methods

2.1. Experimental set-up

This study was part of a larger experiment, described in detail elsewhere (Gómez Álvarez et al., 2006; Weishaupt et al., 2006). The experimental protocol was approved by the Animal Health and Welfare Commission of the canton of Zurich (188/2005; 26.01.2005).

2.2. Horses and riders

Seven dressage horses actively competing at Grand Prix ($n = 6$) or FEI Intermediate ($n = 1$) level were included. The horses were of Warmblood breed (height mean \pm SD 1.70 ± 0.07 m), equipped with their own fitted saddle, bridled with a normal snaffle bit and ridden by their usual riders (three men and four women). The riders had not been training together or with the same trainer prior to the study.

2.3. Kinematic measurements

The experiment was conducted on a high-speed treadmill (Mustang 2200, Kagra AG) with an integrated force measuring system (Weishaupt et al., 2002). Horses and riders were measured at square

Download English Version:

<https://daneshyari.com/en/article/7291951>

Download Persian Version:

<https://daneshyari.com/article/7291951>

[Daneshyari.com](https://daneshyari.com)