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The Effect of Rider Level on Equine Mean Heart Rate at the Trot

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Senior Honors Thesis
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Abstract

The effect of riders at two different levels of riding ability on the mean heart rates (HR) of school horses at the trot was studied. Five horses were each paired with a beginner (n=4) and an intermediate (n=5) rider, and the mean HR generated by the two riders at the trot were compared for each horse. There was a significant ($p<0.05$) relationship between the effect of the rider level and the horse's HR in three of the five horses. Two showed a significantly higher HR with the beginner rider and the third, a significantly lower HR with the beginner rider ($p<0.05$). Since each rider did not ride each horse, it was not possible to differentiate between the effect of the rider level and the effect of the specific rider. These results indicate that physiological data may be useful in the level placement of school horses.

Introduction

The partnership between man and horse has existed for thousands of years, yet the depth of this relationship has not been fully studied. As a rider, one thinks mainly about how their intentional aids influence the horse. However, there are a host of unintentional signals given by the rider that the horse can interpret as well, especially signs of nervousness. Previous studies have shown that during warm-up riding, the rider's and horse's heart rates (HR) become synchronized[1], and that when a rider or unmounted handler is made nervous, inducing a higher HR, their horse will have a similarly high HR though there is no actual threat for the horse to perceive[2,3,4]. Conflictingly, a recent study has shown that in a competition setting, the rider's elevated HR caused by an audience did not affect the HR of their horse[5]. Riders or handlers with more experience have been shown to be at a lower risk of inducing nervousness in their horses[4,6]. Also, when a rider felt they were a good match with their horse, the horse was more likely to have a lower HR when presented with novel stimuli[3]. Mean HR values have been shown to be a good indicator of horse temperament, with lower values indicative of a less-nervous personality[7]. In this study, mean HR data generated at the trot was used to assess the nervousness of horses that participate in both beginner and intermediate lessons. The horses selected for beginner lessons are those considered to have the most tolerant temperaments based on behavioral observation, but for the mental welfare of the horse and the physical safety of the rider, this temperament classification was tested with physiological data. While a beginner rider generally places low physical demands on their horse, they may often create a high mental demand by being nervous and unbalanced on the horse's back. Because of this, it was hypothesized that the horses would have higher mean HRs at the trot when they were ridden by a beginner compared to an intermediate rider.

Materials and Methods

Horses: Five school horses, four mares and one gelding, of various breeds and ages owned by the University of New Hampshire were used for this study. The horses were managed according to standard husbandry practices.

Riders: Nine riders, four beginners and five intermediate, participated in the study. The beginner riders had less than two years of experience, and the intermediate riders had over three years of

experience. All the riders were female students at the University of New Hampshire participating in group riding lessons taught at the university.

Data collection: A Polar RS800CX heart rate monitor was used to measure the horses' HRs (as beats/min every 5s) throughout the beginner and intermediate lessons. The beginner lessons consisted of variable schedules of mostly walk and trot work with some canter. The intermediate lessons consisted of walk, trot, canter and work over fences. All lessons took place in the same indoor arena. Only the values obtained when the horse was trotting were used for analysis.

Analysis: A Two-Way Analysis of Variance (ANOVA) test with the treatments of 'horse' and 'level' and a Student-Newman-Keuls (SNK) Multiple Comparison test were used to statistically analyze the mean HR data. These tests were carried out using Systat (version 13) software. A p value of <0.05 was considered significant.

Results

The ANOVA results indicated that the effect of rider level varied from horse to horse, with a significant ($p<0.05$) interaction between the effect of rider level and the effect of horse. The SNK indicated that in three out of the five horses used, rider level significantly influenced the horses' heart rates (see Fig.1). Sugar had a lower mean HR with the beginner rider (75.7 ± 3.01 vs. 89.1 ± 3.01bpm), while Cosmo and Sable had lower mean HRs with the intermediate riders (112.1 ± 4.25 vs. 104.7 ± 2.46bpm and 106.3 ± 4.25 vs. 96.6 ± 2.13bpm, respectively). However, since each rider did not ride each horse, it is not possible to distinguish between the effects of rider level and the specific rider.

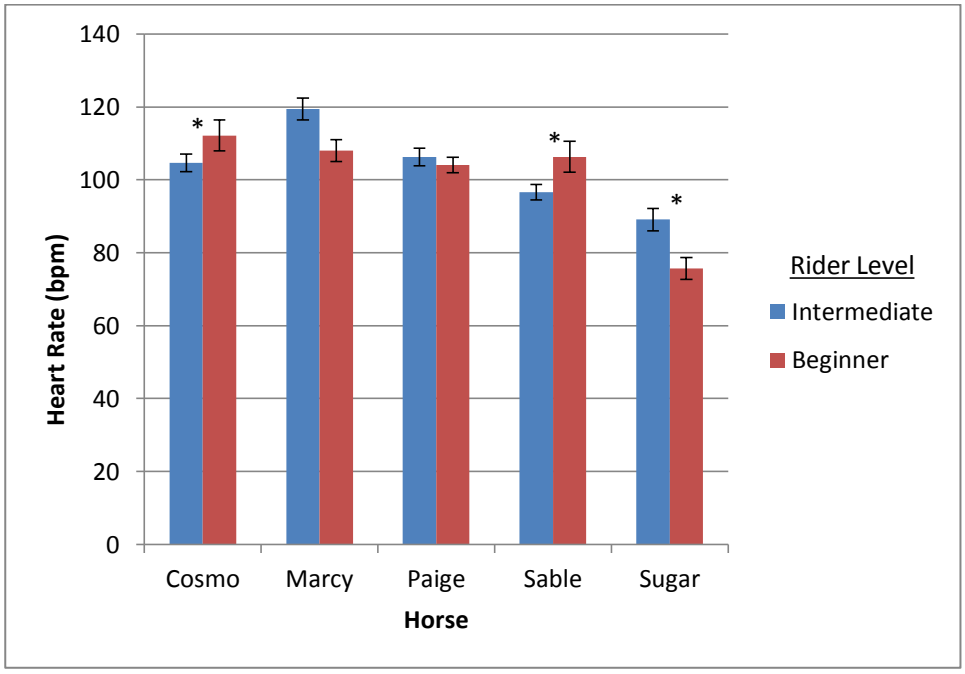

Figure 1: Mean HR at the trot for the five horses used with standard error. Results of the SNK test indicate a significant ($p<0.05$) effect of rider level on mean HR in the horses marked with an asterisk (*)

Discussion

The indication of a significant and varying relationship between rider level and horse shown by the ANOVA test affirms the individuality of each horse's temperament. The SNK results indicated that some horses were more susceptible to the effect of certain riders over others. The two horses who did not have significantly affected HRs, Paige and Marcy, are aptly placed in the beginner class. The nervousness and lower skill of the beginner riders did not lead to nervousness in these horses, which is a key temperament aspect a low-level lesson horse needs. Sugar had a significantly lower HR with the beginner rider, which may indicate that the beginner rider was a better match, or that the intermediate rider demanded more of the horse physically or was a more nervous rider. In either case, Sugar is most likely well suited to beginner lessons, as her lower HR at this level shows that she was relaxed with that rider. Cosmo and Sable both had significantly higher HRs in the beginner class, which may indicate a poor horse-rider match or a temperament that is not well suited to beginner lessons. The higher HRs observed most likely indicate a more alert mental state caused by the rider's nervousness, which can increase the chance of a startle response[8]. Beginner riders are generally not balanced enough to remain mounted on a horse that startles, so the safest placement of these horses that are more affected by the rider's mental state is in a more advanced lesson.

Conclusion

The results of this study show the underlying physiological effect a rider's ability can have on her horse, and how the strength of this effect differs between horses. To more strongly support the hypothesis that rider level affects equine HR, a more standardized study would need to be run in which all the riders of a certain level rode every horse. This would allow the observed results to be distinguished as the effect of the level instead of the effect of specific riders. It would be beneficial to create a standardized protocol for the data collection to eliminate variation due to changes in time at the trot between riders and varied agendas of lessons. Ideally, all riders would ride one horse in identical sets on one day and each rider would have multiple days of collection to eliminate variation caused by daily changes in the horse's mindset. In future studies, a more detailed analysis of the stress response of the horse to riders of differing levels could be investigated. Numerous studies have used heart rate variability and salivary cortisol levels as indicators of stress in horses[9,10,11]. This data could be used to ensure the best lesson placement of the school horse to minimize stress and nervousness for the safety and welfare of both horse and rider.

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