Positive Reinforcement Training for School Horses: Its Use as Enrichment and Its Effect on the Human-Horse Relationship

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Overview

- Introduction
- Study Overview
- Results and Discussion
- Limitations and Future Research
- Conclusions

Introduction

Research Questions

What happens when you add positive reinforcement training sessions into a school horse's routine?

Does it act as enrichment?

How does it compare to food-toy based enrichment sessions?

Does it change how they act towards humans?

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Why positive reinforcement training?

- Positive reinforcement training has shown many benefits in horses: increased learning speed[8], less stress[8], more motivation to participate[9, 10], more exploratory behavior[9], and lower body tension[10]
- There is some support of positive reinforcement training creating generalized behavioral effects in other species[2, 3, 4, 5, 6, 7], but this has not been systematically studied in horses
- The equine community has been slower to adopt positive reinforcement training than trainers of other species[1]
- People who are unwilling to change their primary methods might be open to the idea of adding positive reinforcement training sessions as a supplement to their standard training routine

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Enrichment

Why is it used?

- Environmental enrichment is particularly relevant to ridden horses, as they are often kept in housing conditions that compromise their well-being, such as individual stalls with few opportunities for voluntary exercise or social interactions[11]
- Environmental enrichment programs for horses have been shown to improve welfare, improve learning performance, and create beneficial biological effects[11]

What types are typically used in equines?

- Forage[12, 13], food toys[14, 15,16], and novel objects[17,18]
- Little is known about how human-horse interactions impact horses[19] and there is little research to show evidence of human-horse attachment[20]

How do we know it's "working"?

- Changes in time budgets[21]
- Anticipatory behaviors[21]
- Reduction in stereotypy[14, 15,16]
- Generalized behavior changes (shown in other species[2, 3, 4, 5, 6, 7])

What do we know about the Human-Horse Relationship?

- Horses have a high level of discrimination of individual interactions, which can build into lasting associations with individuals based on how they have interacted with them in the past[22, 23]
- Negative prior experiences have a bigger impact than positive ones[22]
- Despite their ability to discriminate individual humans, repeated interactions with the same human or similar training styles can change how horses perceive humans, especially unknown ones[22]
- The daily caretaker may be an important factor in how horses perceive human[24]

Study Overview

Participants

Selection Criteria

- All horses boarded at the same facility and were enrolled in at least 3 riding lessons per week with at least 2 different riders
- 16 horses evaluated, 15 chosen as participants
- Owner reported temperament assessment[25] to match groups
- No restrictions on breed, size, age, or sex
  - 8 mares, 7 geldings
  - Varying breeds
  - 7 to an estimated 30 years old
  - 12 to 17.3 hands

Why school horses?

- School horses typically interact with and are ridden by more individuals than privately owned horses
- School horses are ridden by many beginner riders, which increases the risk of compromised welfare due to beginner riders' lack of knowledge and experience[26]

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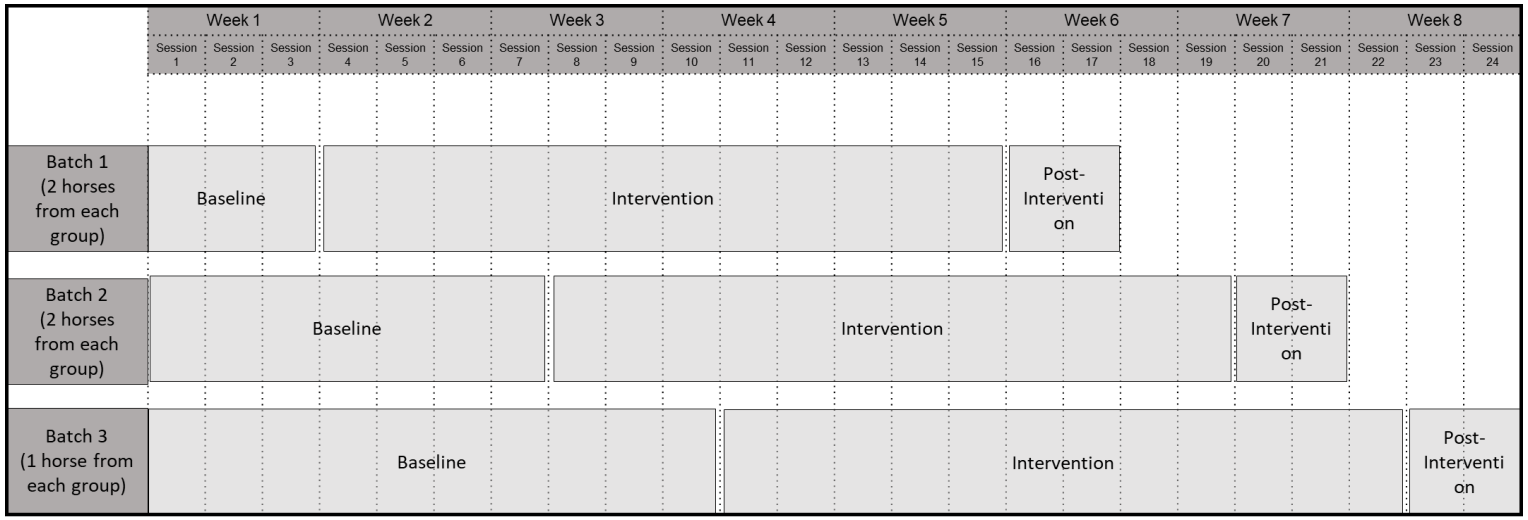
Study Overview

- 3 experimental groups: Positive Reinforcement Training (R+), Food Enrichment (FE), and Control (C)
- Multiple Baseline Design
    - Helps to eliminate external factors
    - 3 different “batches” of baselines for feasibility
    - Horses in each condition distributed equally across batches
- Baseline and Post-Intervention Motionless Human Tests
- 3 sessions per week for up to 8 weeks



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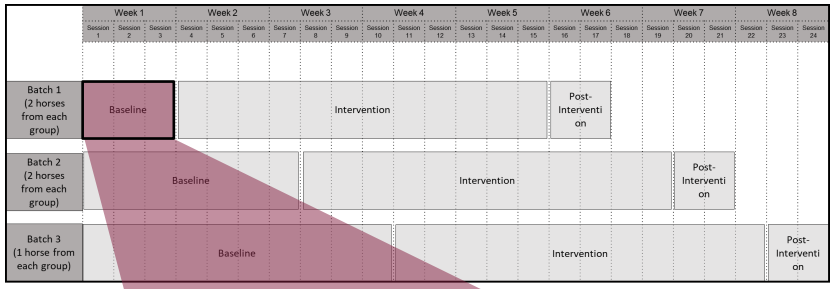
Study Design Breakdown - Baseline Sessions



Acclimation Session
Baseline Sessions
Pre-Test MHT with Trainer
Pre-Test MHT with Stranger
Preference Assessment

- 3 sessions for Batch 1 horses, 6 for Batch 2 horses, and 8 for Batch 3 horses
- All sessions occurred in the same round pen
- Each session was 12 minutes
- Sessions were video recorded, and behaviors were coded for the number of transitions and the different behavior categories

Baseline Clip - Saint

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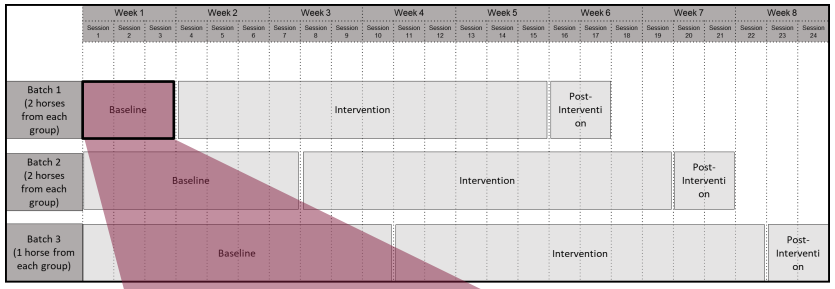
Study Design Breakdown - Baseline



Acclimation Session
Baseline Sessions
Pre-Test MHT with Trainer
Pre-Test MHT with Stranger
Preference Assessment

- Procedure was performed as described by Larssen and Roth[26]
- 2 minutes in duration
- Measured time spent in proximity (1 meter) of human and time spent touching human

Motionless Human Test Clip - Cupid

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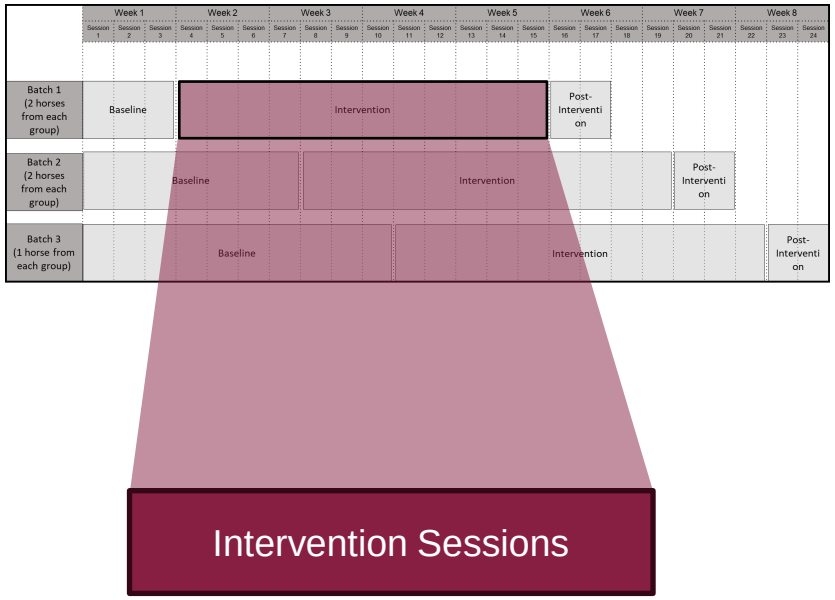
Study Design Breakdown - Intervention



- 3 sessions per week for 4 weeks
- All sessions occurred in the same round pen
- Each session was 12 minutes
    - 2 minutes in the beginning when the horses were alone for observation of anticipatory behaviors and then 10 minutes with their assigned intervention
- Sessions were video recorded, and behaviors were coded for the number of transitions and the different behavior categories

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Study Design Breakdown - Intervention

Positive Reinforcement

- Positive reinforcement training with me
- Target behaviors: standing still, touching a handheld target, moving with the researcher (walk and trot), backing, and stepping on a mat
- Food reinforcer (foods in putative reinforcer mixture were determined by the preference assessment)

Food Enrichment

- Food toy hung in round pen: Uncle Jimmy's Hanging Balls, switched to Yoga Ball Food Toy on Session 12
- No other interaction with human

Control

- Horses spent session in the round pen, by themselves

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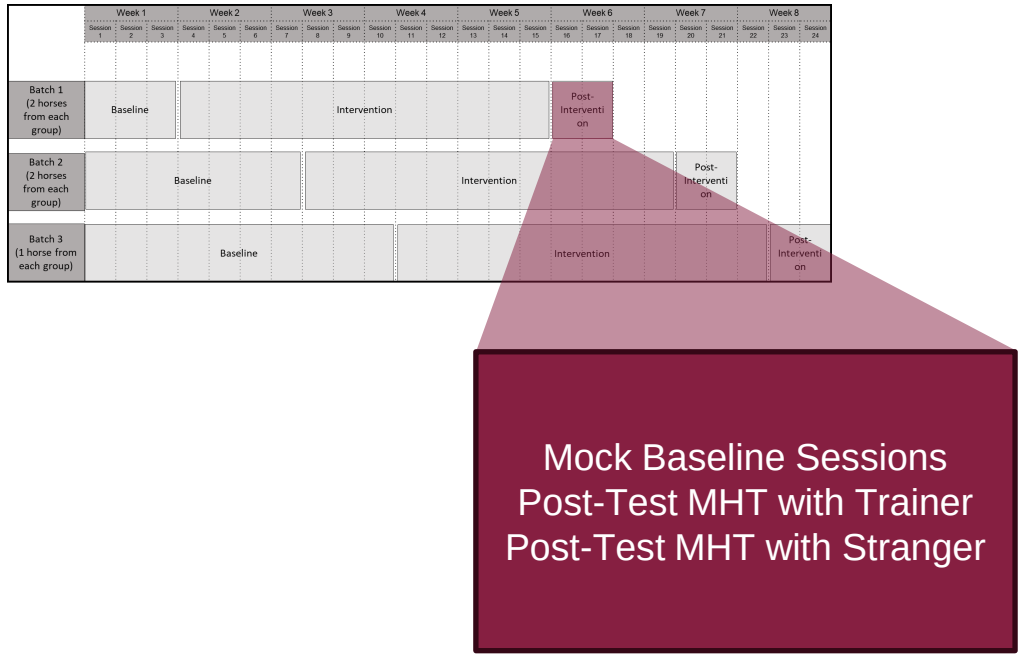
Study Design Breakdown - Post-Intervention



- One mock baseline session before each Motionless Human Test to replicate the Baseline Motionless Human Tests, protocol identical
- To ensure novelty of the stranger, horses were tested with two individuals, one during the baseline test and another during the post-intervention test

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Results and Discussion

Motionless Human Test

Motionless Human Test

	Trainer Condition	Stranger Condition
Proximity	**Horses in the R+ group spent significantly more time in proximity of the trainer** than the FE group (p = 0.0302, 95% CI = 7.03, 38.83) and more time than the C group, but the result was not significant (p = 0.0517)	Pre-test and post-test values for proximity were **not significantly different for any group** (p = 0.4608)
Touch	**Horses in the R+ group spent significantly more time touching the trainer** than the FE group (p = 0.0149, 95% CI = 2.63, 23.27) and more time than the C group, but the result was not significant (p = 0.0903)	Pre-test and post-test values for touch were **not significantly different for any group** (p = 0.2356)

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Motionless Human Test - Trainer

	Average Difference (Post-Test minus Pre-Test) (mean seconds ± standard deviation)	
	Trainer Proximity	Trainer Touch
R+ Group	48.63 ± 39.78	9.36 ± 8.45
FE Group	-24.30 ± 31.64	-3.59 ± 3.67
C Group	-16.80 ± 44.63	0.36 ± 5.23

Motionless Human Test - Trainer

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	Trainer Proximity	Trainer Touch
R+ Group	48.63 ± 39.78	9.36 ± 8.45
FE Group	-24.30 ± 31.64	-3.59 ± 3.67
C Group	-16.80 ± 44.63	0.36 ± 5.23

How does this compare to recent research?

Trainer

Two recent studies have found that after the implementation of a positive reinforcement training regimen, horses increased contact seeking behavior with the trainer[23, 28]

This matches the result we found

It's a match!

- As noted by many, positive reinforcement training increases contact seeking behavior from the horse towards the positive reinforcement trainer

Stranger

Three recent studies found that after the implementation of a positive reinforcement training regimen, horses increased contact seeking behavior with a stranger[23, 27, 28]

This is in contrast to the result we found

Why might our results differ from the others?

- Different sample characteristics (age, training history)
- Varied positive reinforcement training protocols
- MHT procedural differences

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Behavioral Coding

Behavioral Transitions

- Calculated the behavioral transition rate for each session
  - The number of total state behaviors divided by the total time
- Plotted the behavioral transition rate for each session

Behaviors
Rubbing
Rolling
Standing Rest
Stand Normal
Stand Alert
Walk
Trot
Canter
Smell object
Wood chewing

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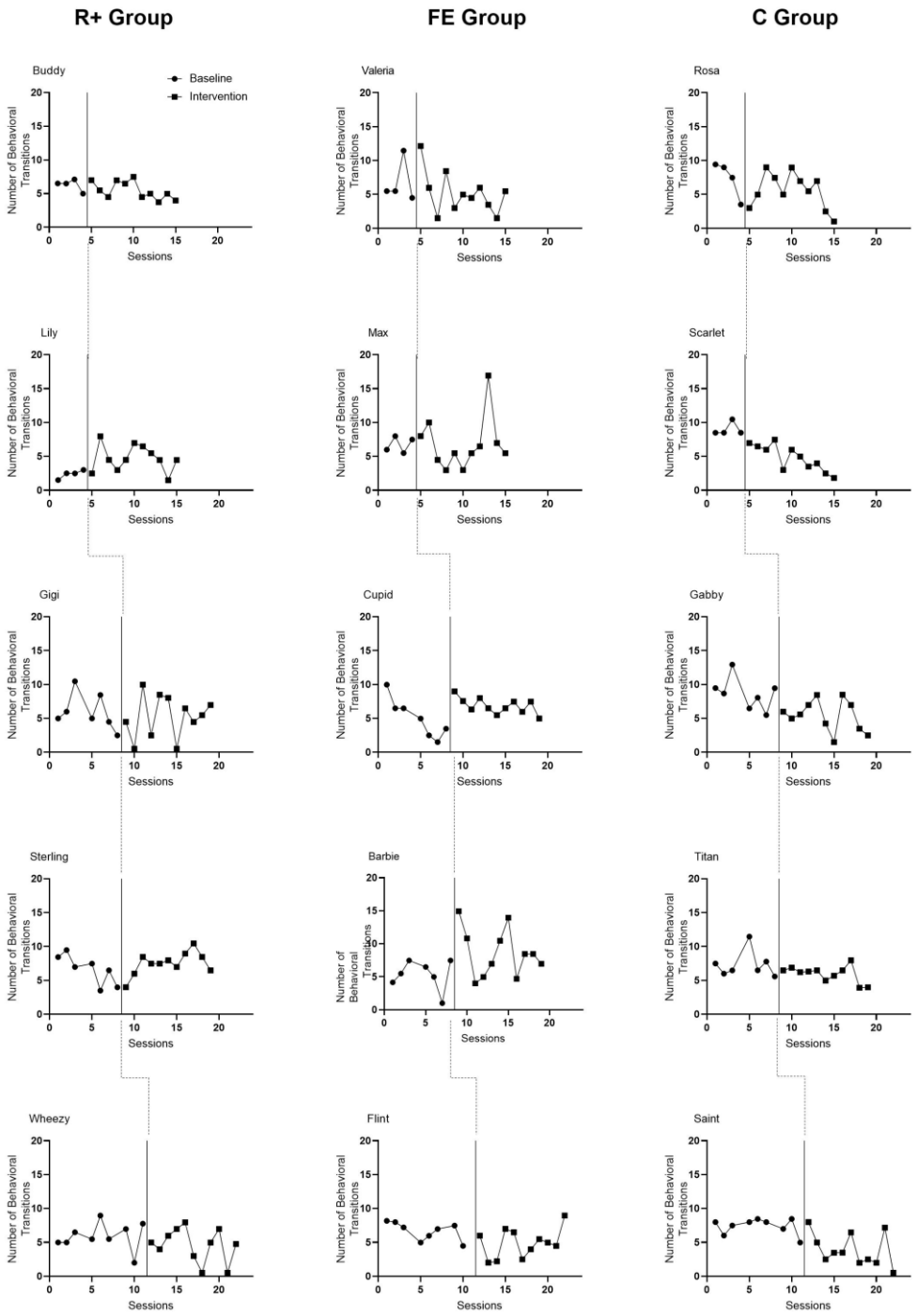
Behavioral Transitions

- Calculated the behavioral transition rate for each session
  - The number of total state behaviors divided by the total time
- Plotted the behavioral transition rate for each session
  - C group showed a steady decrease in the number of behavioral transitions throughout the study
  - R+ and FE group horses showed a similar baseline trend, but it did not continue into the intervention phase



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Behavioral Transitions

- Tau U statistics confirmed the visual analysis
  - C group horses showed a significant effect size
  - FE and R+ horses did not
- No difference between the R+ and FE groups

Group	Tau	Z	p value
R+	0.031	0.2244	0.8224
FE	0.0574	0.4131	0.6795
C	-0.6504	-4.7056	<0.0001

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Behavioral Categories

- Calculated percentage of time spent in each category for each session and plotted them
- Visual analysis determined that there was no overall pattern that provided compelling evidence of a change related to any specific intervention
- This was confirmed by the one-way ANOVA conducted on the difference of the average of time spent in each category during baseline and intervention phase across groups
    - $p_{maintenance} = 0.6226$
    - $p_{standing} = 0.9434$
    - $p_{locomotion} = 0.2340$
    - $p_{A\&I\ Movement} = 0.2623$
    - $p_{A\&I\ Investigation} = 0.1714$

Category	Behaviors
Maintenance	Rubbing
	Rolling
	Standing Rest
Standing	Stand Normal
	Stand Alert
Locomotion	Walk
Arousal & Investigation - Movement	Trot
	Canter
Arousal & Investigation - Investigation	Smell object
	Wood chewing

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How does this tie into the literature?

Transitions

Peters et al.[21] showed that the number of behavioral transitions correlates with heart rate in positive anticipation of a food reward.

This matches the result we found

Categories

Peters et al. [21] found increases to the duration of time spent in the standing, locomotion, and arousal and investigation behaviors and a decrease in the duration of time spent in the maintenance behaviors during positive anticipation of a food reward.

This is in contrast to the result we found

It's a match!

- Regardless of whether it was delivered as a food toy or as a part of a positive reinforcement training session, the horses showed an increase in anticipation compared to the control group.

Why might our results differ from the other?

- Modified ethogram
- Different contexts
- Food droppings present in the round pen

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What are the implications?

- Horses in both intervention groups showed greater anticipatory behavior compared to the control group, but there was no difference between the food toy and the positive reinforcement groups
    - The added social component of a positive reinforcement training session does not appear to add value to the horses in the way that it might for a dog
    - Individual differences might have an impact on the horse's perceived value of the sessions
- Implementation of food toy enrichment is easier than positive reinforcement training sessions and might be preferred for busy school barn environments

Limitations and Future Research

How could we improve?

- Stricter cleaning protocols between participants
- Provide a forage opportunity in the round pen
- Extend the baseline period
- Extend the intervention period to nine weeks
- Expanded study with more participants

What could we do next?

- Within groups study comparing anticipatory behaviors in individual horses for different types of enrichment

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Conclusions

What did we learn?

Adding **positive reinforcement** training sessions to ridden horses' regular training regimen **provides valuable enrichment** and can **increase the relationship** between the horse and person who trains with the horse.

Providing regular **food-toy** sessions is an **equivalently good way to provide valuable enrichment** to school horses with less resources than positive reinforcement training, but it **does not provide the same benefits to the human-animal relationship**.

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Research Questions

What happens when you add positive reinforcement training sessions into a school horse's routine?
Good things!

Does it act as enrichment?
Yes!

How does it compare to food-toy based enrichment sessions?
Equivalently!

Does it change how they act towards humans?
Yes, towards the trainer, but not a stranger!

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Appendix

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