Canine Nosework as an Intervention for Behavior Change in Shelter Dogs

Submitted by Nisa Semione

Virginia Tech, Applied Animal Behavior & Welfare

Committee Chair: Dr. Erica Feuerbacher

Introduction

Overview

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

Sheltering in the U.S.

- Approximately 3 million dogs enter U.S. shelters annually (ASPCA, 2019)
- Euthanasia rates have declined, but 390,000 dogs are still euthanized every year in U.S. shelters (ASPCA, 2019)
- Time spent in the shelter causes stress and can contribute to welfare concerns in dogs (Beerda et al., 1999; Beerda et al., 2000; Stephen & Ledger, 2006)

Enrichment for Shelter Dogs

- Goals of enrichment are to increase species typical behaviors, increase ability to cope with challenges, broaden behavioral repertoire, and decrease frequency of maladaptive or problem behaviors (Young, 2003)
- Enrichment types
  - Conspecifics (Hetts et al., 1992; Hubrecht et al., 1992)
  - Human social contact (Hennessy et al. 1997; Hennessy et al, 1998; Wells & Hepper, 2000; Coppola et al., 2006; Normando et al., 2009; Protopopova et al., 2012)
  - Sensory (Wells & Hepper, 2002; Graham et al., 2005; Kogan et al., 2012; Bowman et al., 2015; Bowman et al., 2017; Brayley & Montrose, 2016)
- Efficacy can be assessed by behavioral and physiological measures

Olfactory Enrichment for Shelter Dogs

- In domestic dogs, olfaction is the primary sensory modality used to interact with the environment (Hepper, 1988; Walker et al., 2006)
- Olfactory enrichment in shelters
  - Essential oils (Graham et al., 2005; Binks et al., 2018; Amaya et al., 2020)
  - Dog-Appeasing Pheromone (DAP) (Hermiston et al., 2018)
  - Scented toys (Murtagh et al., 2020)

Canine Nosework

- Trains dogs to alert and discriminate between odors in various levels of difficulty
  - Taught with food in foundation training
- Purported to provide dogs with opportunities to engage in species typical behaviors like foraging and activate the seeking system (Ogleby, 2019)
- Limited research
  - Duranton & Horowitz, 2019

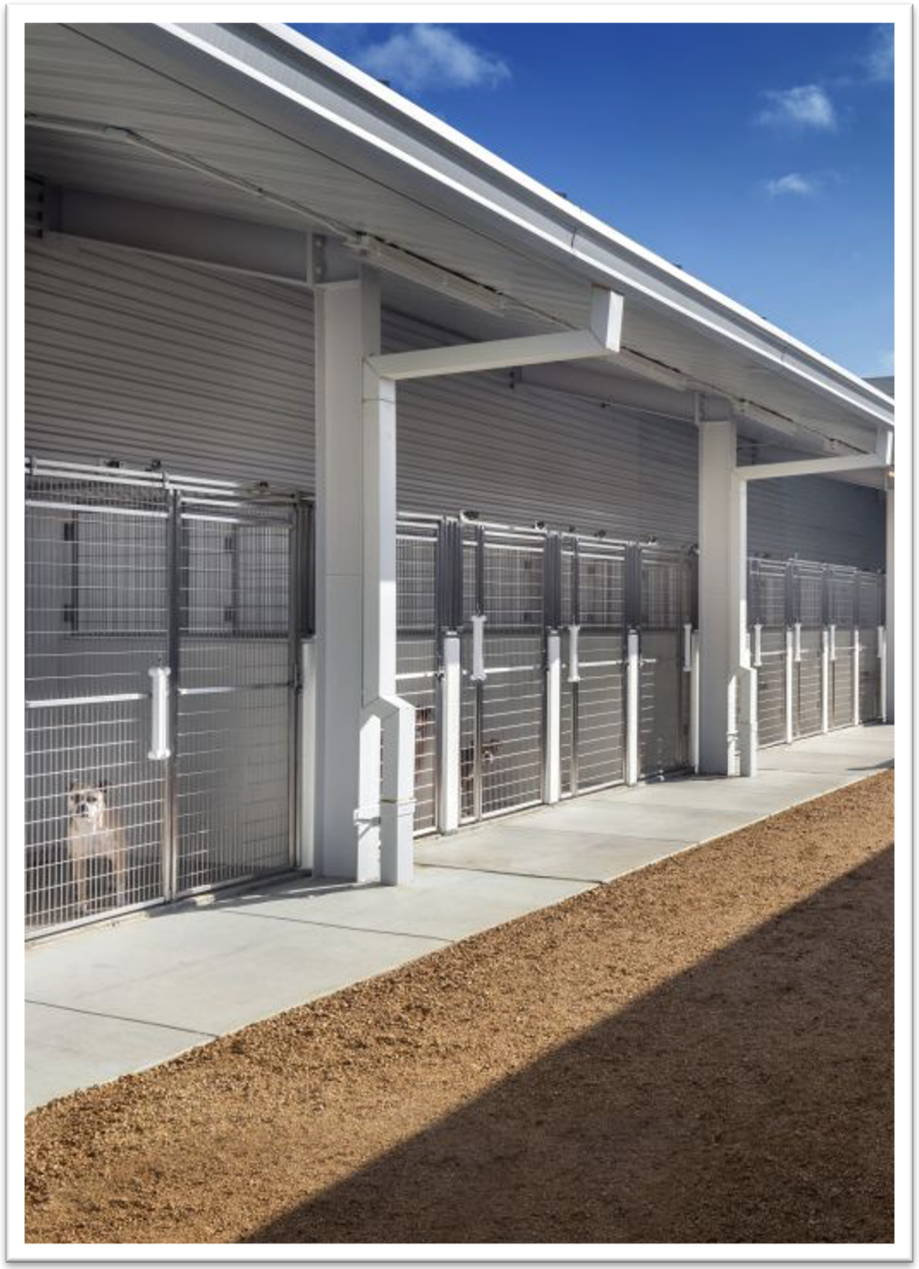
Study Overview

Research Questions

Do opportunities to engage in nosework activities result in decreased frequency of behaviors associated with stress or poor welfare?

Do opportunities to engage in nosework activities result in increased frequency of desirable behaviors?

Do nosework activities affect behavior in shelter dogs to a greater extent than positive human social contact?



Methods

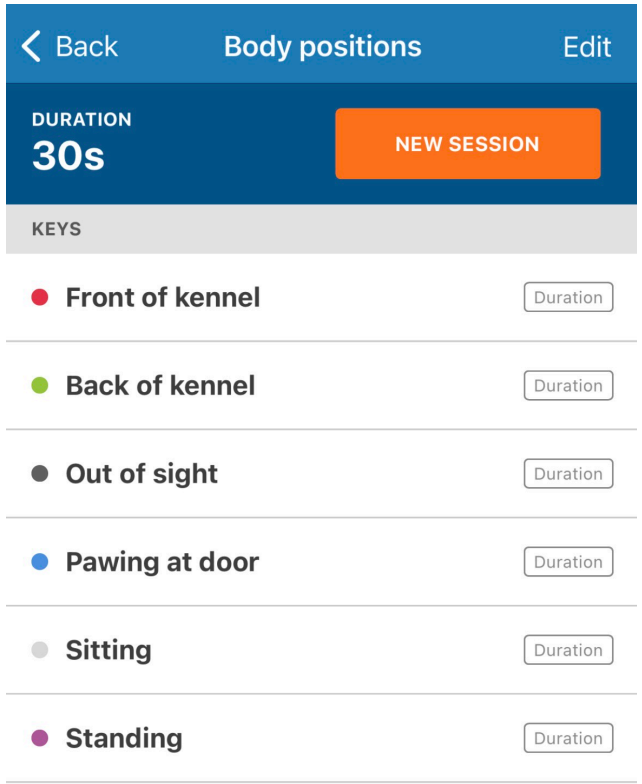
- Subjects
  - 38 adoptable dogs
- Setting
  - Harris County Pets in Houston, TX
  - Open intake municipal shelter
  - 253 dog kennels
- Study design
  - Between subject design

Procedure

- Day 1
  - 30-second video recorded by researcher
  - Dogs outfitted with Whistle activity monitors
- Day 2
  - 15-minute intervention with researcher
  - 30-second video recorded by research assistant
- Day 3
  - 30-second video recorded by shelter staff
  - Whistle activity monitors removed by researcher

Example. Dog response to researcher approaching the kennel

Table 1. Ethogram of In-Kennel Behaviors of Shelter Dogs



Behavior	Operational Definition
Body position	
Front of kennel	Located between front of cage, and up to and including the midpoint of kennel
Back of kennel	Located between back wall of kennel, and up to, but not including, midpoint of kennel
Out of sight	Not visible from the front of the cage, behavior cannot be defined
Sitting	Supported by two extended front legs and two flexed back legs
Standing	Supported upright with all four legs
Pawing at door	One front paw makes contact with the cage door
Locomotion	
Jump on cage	Both front paws make contact with the cage door that does not include lunging
Lunging	Quick diagonal forward motion; may be accompanied by barking, growling or piloerection
Pacing	Repeatedly (>3) locomoting around kennel in fixed route
Jump at neighbor	Both front paws make contact with the cage wall parallel to the neighboring kennel
Vocalization	
Barking	Vocalization of very short duration and low frequency
Growling	Throaty, rumbling vocalization; usually low in pitch
Howling	Prolonged high-amplitude vocalization of varying pitch, lips drawn together while exhaling
Whining	A cyclic vocalization
Grooming	
Scratching	Paw makes repeated contact with body/face; head may be angled in direction of moving limb
Licking self	Oral contact with any part of body
Shaking off	Motions body and/or head back and forth repeatedly and rapidly

Data Analysis

- R version 4.3.1 was used to complete all analyses
- Behaviors that were analyzed included barking, standing, and jumping on the cage
- Data were recorded as the proportion of video time spent performing each behavior
- Beta regression models were used to determine whether the proportion of time spent performing a given behavior was explained by the enrichment intervention, day, or the interaction of the two

Inter-Observer Reliability

- 20% of videos double coded
- In agreement if within 3 seconds
- 96% inter-observer reliability

Nosework Sample Session

Petting Sample Session

Results and Discussion

Dog Demographics

- Age
  - Mean: 1.89 years
  - Range: 6 months-7 years
- Sex
  - Male: 20 (15 intact; 5 altered)
  - Female: 18 (13 intact; 5 altered)
- Length of stay
  - Mean: 28.9 days
  - Range: 6-104 days

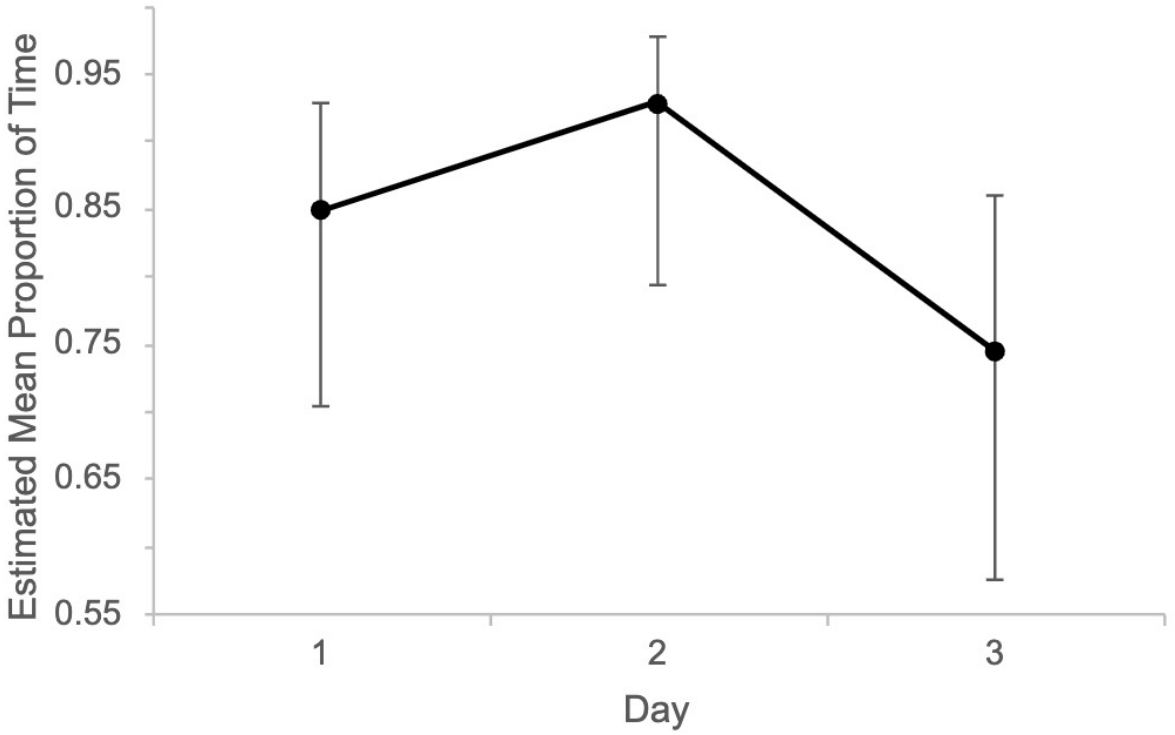


Figure 1. Mean Proportion of Time Spent Standing by Day

Table 2. Mean Proportion of Time Spent Standing by Day

		Model Estimated Mean	SE	Overall p-value
Day	1	0.847	0.0558	0.0310
	2	0.928	0.0413	
	3	0.744	0.0736	

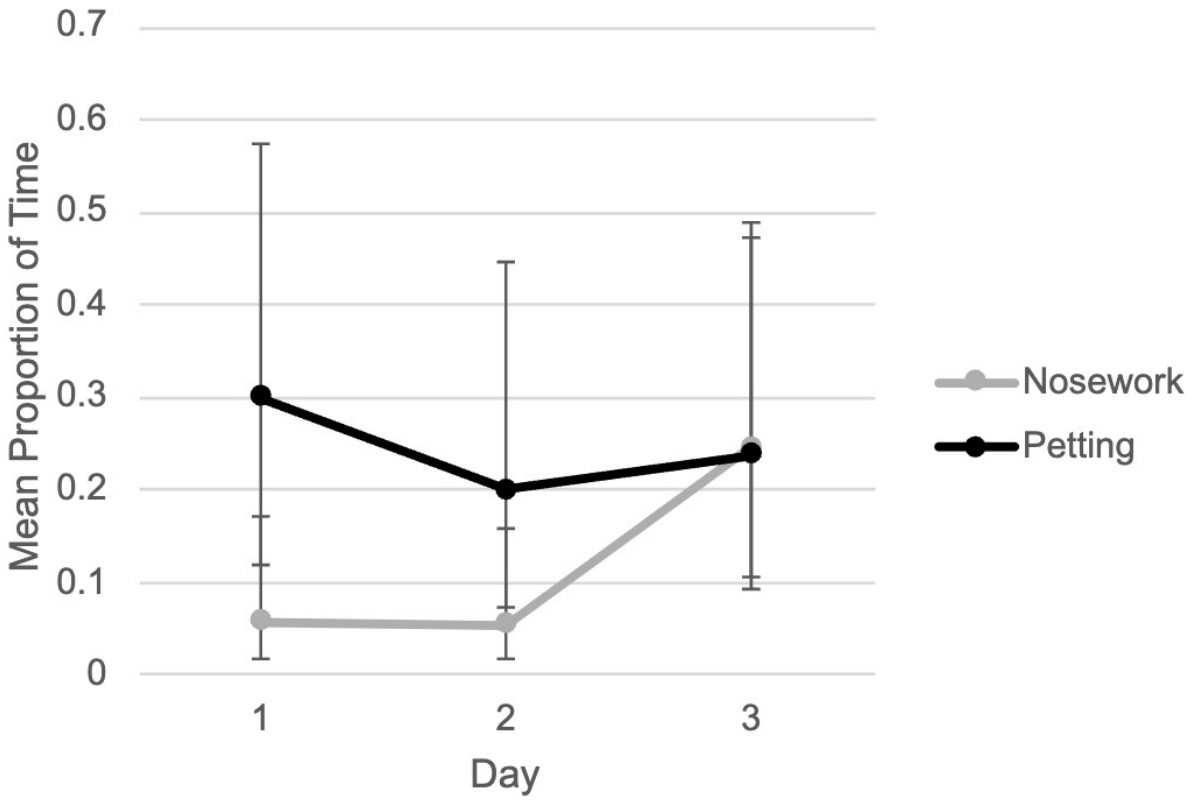


Figure 2. Mean Proportion of Time Spent Barking by Day and Intervention

Table 3. Mean Proportion of Time Spent Barking by Day and Intervention

Intervention	Day	Model Estimated Mean	SE	Overall p-value: 0.00235
Petting	1	0.2999	0.1233	
	2	0.2009	0.096	
	3	0.2382	0.1035	
Nosework	1	0.0577	0.0336	
	2	0.0544	0.0311	
	3	0.2466	0.0952	

Table 4. Mean Proportion of Time Spent Jumping on Cage by Day and Intervention

		Model Estimated Mean	SE	Overall p-value
Day	1	0.134	0.050	0.5848
	2	0.105	0.060	
	3	0.181	0.097	
Intervention	Petting	0.123	0.057	0.6419
	Nosework	0.152	0.046	

Nosework Condition

- Significant interaction between intervention and day regarding the proportion of time spent barking
- Proportion of time spent barking was four times greater the day after the intervention than in either of the days prior (day-before mean = 0.06, SE = 0.03; day-of mean = 0.05, SE = 0.03; day-after mean = 0.25, SE = 0.09; p = <0.01)

Nosework Condition

- Why the increased proportion of time spent barking on Day 3?
  - Strangers as discriminative stimulus for +R? If yes, how would this differ from the shared experiences of the petting group dogs?
  - Food controlled for across interventions

Petting Condition

- No differences detected in the proportion of time spent barking between days
- Exhibited higher percentages of barking across all days compared to the nosework group

Combined Effects

- No significant effects on the jumping on cage behavior found in either intervention
- Significant main effect of day on the standing behavior, which suggests that the interventions uniformly impacted the proportion of time dogs spent standing across days; proportion of time was 1.25 times greater in the day-of video than in the day-after video ($z = 2.619$, $p = 0.0240$)
- No carryover effects of increased standing behavior found in either intervention on Day 3

Limitations and Future Research

Limitations

- Sample size
- Limited data
  - Intervention frequency
  - Duration of behavior videos
- Possible habituation to shelter staff

Future Research

- Repeat with larger sample size
- Control for baseline barking behavior with similar proportions of barking exhibited between intervention groups
- Inclusion of remote monitoring camera
- Inclusion of physiological measures

Conclusions

What We Learned

- Data does not support unique effects of the nosework condition on positive behavior change
- Both interventions increased proportion of time spent engaging in desirable behaviors on Day 2, but did not affect undesirable behaviors
- Data demonstrates unforeseen effect of nosework intervention on barking behavior on Day 3

Implications

- Time out of the kennel may be more important to the behavior and welfare of shelter dogs than the specific enrichment activity
- The time of day that enrichment activities are provided may better support improved kennel presence with unknown people

Thank You!

Committee

Dr. Erica Feuerbacher

Dr. Lisa Gunter

Dr. Kristina Spaulding

Research Assistant

Ahmed Monib

Statistics and Figures

Alicia Arneson

Harris County Pets

Steven Caldwell

Questions?